

FROM KNOWLEDGE-BASED ECONOMY TO ... KNOWLEDGE-BASED
ECONOMY? REFLECTIONS OF CHANGES IN THE ECONOMY AND
DEVELOPMENT POLICIES IN THE NORTH EAST OF ENGLAND

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ABSTRACT

Against the background of claims made about the emergence of a new
Knowledge-based Economy, I explore the role of knowledge, learning and
innovation in the economy and in relation to regional economic development and

to successive conceptions of regional development policies through the lens of the successive transformations of a particular regional economy – that of north east England. Rather than seeing knowledge as something that has only recently become relevant to economic performance and to understanding of the economy and economic development, I argue that knowledge is central to all economic activity, and that different types of such activity draw upon and require different types of knowledge.

Introduction

There is widespread agreement that all economic activity – as purposeful human behaviour – necessarily depends upon knowledgeable behaviour and intentional human action; without a knowledge base, such activity would clearly be impossible. Thus an economy that is not based upon knowledge is, literally, inconceivable. The creation of knowledge has been integral to the development of capitalist economies since they were first constituted as capitalist, as Marx and Schumpeter (among other political economists) emphasised. Much of the revolutionary potential of capitalism has always rested in its capacity to create new commodities and new ways of commodity production via successive radical transformations of the forces of production and the labour process. Marxian political economy, conjoined with more recent approaches such as those of the French regulationists (for example, see Jessop and Sum, 2007), continues to provide a powerful perspective thought which to understand the contemporary

economy, especially in those versions of cultural political economy (for example, Sum and Jessop, 2008) that seek more explicitly to incorporate consideration of issues of meaning and semiosis with more traditional concerns of commodity production and value. Such perspectives of Marxian political economy inform the interpretative approach adopted in this paper approach

Much has also been written in recent years about knowledge creation and transfer and related issues from more recent and different theoretical perspectives, such as those of knowledge creation, learning and national and regional innovation systems that place considerable weight upon knowledge and learning per se as sources of competitive advantage and economic success (LUNDVALL, 1992; NONAKA and TAKEUCHI, 1995). There are three main ways in which knowledge is now seen as more important in the economy. Firstly, there is greater emphasis on knowledge per se as a commodified output, in part linked to the greater significance of symbolic products. Secondly, there is greater emphasis on increasing the knowledge intensity of existing commodities, both material and immaterial, shifting up the value chain towards more knowledge intensive activities. And, thirdly, partly linked to this, are the increasingly blurred boundaries between material commodities and services produced via the interaction of people and things.

Initially, influenced heavily by the experiences of parts of the USA, such as California and New England, and the advocates of the 'triple helix' approach

(ETZKOWITZ and LEYDESDORFF, 2000) these placed most emphasis on flows of codified knowledge within formal organisational and institutional structures and upon links between 'high-tech' industries and entrepreneurial Universities in the translation of scientific knowledge into innovative products and processes (LUNDVALL and MASKELL, 2000). However, later and more nuanced approaches placed more emphasis upon tacit knowledge and the interactions and relationships between codified and tacit knowledges (for example, see AMIN and COHENDET, 2003; ASHEIM and COENEN, 2005; JENSEN et al, 2007).

This growing emphasis upon knowledge has been influential in shaping new conceptions of urban and regional development policy and strong claims have been made as to the potential of such developments for urban and regional regeneration, linking the knowledge-based competitive advantage of firms with that of territories defined at various spatial scales (BRACZYK et al, 1998; SIMMIE, 1997). This draws attention to the significance of the place-specificity of processes of knowledge production and translation and the importance of tacit knowledge in enabling codified knowledge to be effectively deployed in the economy in place. The successful economies of fin-de-siècle capitalism are seen to be those of territories (cities, regions, national states) that, by good luck or judgment, have become constructed around activities grounded in valuable knowledges that can be literally capitalised and become a source of profit. The future success of these territories is seen to depend on the continuing production of new knowledge, translating this into innovative products and processes and maintaining first-mover

advantages. This emphasis within policy discourse reflects perceived changes in the ways that knowledge is now seen as important in the economy. The task of public policy is then to try to ensure that the knowledge-based process of moving forward, ever onward and upward, is facilitated in successful places and that the lessons of their success are translated to unsuccessful places, in so far as this is possible within the parameters of capitalist social relations.

Claims about the emergence of new KBEs can therefore also be seen as recognition that the knowledge bases of formerly successful economic activities (as registered in mainstream indicators of capitalist development) and the regional economies that these helped constitute have been rendered redundant by sectoral, technological and spatial shifts in the capitalist economy. Consequently, commodities that could once be profitably produced in a given place can no longer be so. This recognises that the economy is knowledge-based but that capital valorises some knowledges while devalorising others. Therefore, so the policy story goes, it follows that reconstruction of the economies of places that have become unsuccessful requires shifting to new activities with different knowledge bases that can be successfully capitalised and valorised and learning from the experiences of economic 'hot spots'. It is this that is signalled by normative claims about the perceived need to move trajectories and encourage and facilitate the emergence of a new KBE via specific forms of public policy that privilege particular sorts of knowledge and institutions in the creation and dissemination of that knowledge. In this, of course, there are two major assumptions. First, that the

bases of success of the 'successful places' have been correctly analysed and diagnosed in terms of the primacy of such knowledge as the main source of competitive advantage. Secondly, that the direction of the causal links between theory and practice has been correctly specified. However, this is a matter of debate – some see theory as shaping practice, others see theory as reflecting practice while others see links between the two as reciprocal and complex, not easily amenable to sweeping generalization, leaving the issue of the effects of policy unresolved (HUDSON, 1999; MORGAN, 1995; LOVERING, 1999).

Seen in this context, the issues to be addressed in this paper can be re-stated in terms of a number of questions. First, and centrally, how have changing conceptions of the role of knowledge been reflected in successive strategies for regional development in north east England, and in particular in the recent turn to an explicitly knowledge-based economy? In turn, this requires some consideration of broader questions. What is the role of knowledge relative to other factors and processes as a source of competitive advantage? What is new and specific about the role of knowledge at the leading edges of contemporary capitalist development? What sort of knowledge, development strategy and policies are required for what sort of economy? Indeed what may well be at issue is what we mean by the economy, what counts as 'the economy', and how we conceptualise it. This may involve consideration not simply of the differing knowledge bases of varied types of economic activity but more fundamental questions relating to different concepts of value and processes of valuation within a more

heterogeneous and plural conception of what is to be counted as 'the economy'.
But this is to anticipate ...

In this paper, therefore, and against the background of more general claims made about the emergence of a new KBE (ALLEN, 2002; HUDSON, 2001; 2005; JESSOP, 2000; LEINBACH and BRAUN 2001), I want to explore the changing role of knowledge in the economy through the lens of the successive transformations of a particular regional economy – that of north east England – and the successive conceptions of development policy that have been pursued there and, if only implicitly for much of the time, shifting conceptions within policy of the required knowledge base for that economy to prosper. The remainder of this paper falls into five sections. First, I consider in more detail some of the claims as to what is seen to be new in terms of knowledge and the new ways in which knowledge is now seen as economically significant. The next section considers the emergence and development of the north east region's economy from the nineteenth century, as a centre of radical innovation and knowledge creation that underpinned its economic success. Thirdly, in response to the secular decline of that economy from the late 1950s, I examine the emergence of an alternative branch plant economy, with its very different requirements in terms of knowledge, and various alternatives that were explored to that largely unsuccessful development policy, such as the pursuit of endogenous growth through small firms. Then, in recognition of the limitations of all these various policy options, a new suite of policies that self-consciously sought to promote the emergence of a

new and more managed KBE in the region began to appear from the 1990s. These are considered in the penultimate part of the paper. Finally I reflect upon this developmental and policy history and seek to draw some lessons from it.

So what's new about knowledge in the 'new' economy and the way we think about it now?

Given that there is a general acknowledgment as to the importance of knowledge in the economy, why then the recent widespread fascination, even obsession, with knowledge-based economies (KBEs), both in academic discourse and development policies? What is seen now as novel about the role of knowledge in the "new" economy)? What's all the fuss about?

In recent years the social science and business literatures have become replete with claims as to the growing importance of knowledge and information flows in an (allegedly) weightless, de-materialised "new" economy of informational capitalism (CASTELLS, 1996), in particular in terms of the extent to which knowledge can be digitised, commodified, and capitalised to underpin a new knowledge-based economy. There are strong claims to the effect that this new economy operates in a complex, non-propinquitous, multidimensional cyberspace, with novel spatial dynamics grounded in the possibilities that cyberspace offers for simultaneous co-location of myriad entities and relationships (JESSOP, 2000, 4; see also LEINBACH and BRUNN, 2001). Moreover, there is no doubt that there has also

been some growth in the importance of some sorts of knowledge and information in the economy in relation to material commodity production, to the production of high 'level services, and to the production of a range of 'symbolic' commodities.

The selectively increased importance of flows of knowledge and information in some sectors of capitalist economies has highlighted the importance of processes of knowledge creation and flows of information within firms via a range of types of learning (such as single and double loop) and ways of learning (by doing, by imitating, by watching, in working and so on). These become linked in inter-related and recursive ways so that learning and innovation involve complex circuits of knowledge and information rather than the linear flows of the hierarchical R&D model. The growing distancing of many economic relations within an increasingly spaced-out economy as the locations of activities both within and between firms become further separated by physical distance is made possible by increasing digitalisation and other improvements in ICT and transport technologies. Flows of information both increase in volume and in distance travelled, as do flows of people as sites of embedded and tacit knowledges, in the process re-working the meaning of work in the globalising economy (JONES, 2008). More generally, there is evidence of the creation of new global circuits of intellectual capital (THRIFT, 2005).

Recognising these recent changes, it is nonetheless equally important to acknowledge that the economy has always depended on knowledgeable workers,

flows of knowledge and information and mixes of codified and tacit knowledge so that claims as to the increased importance of flows of knowledge and information for economic performance must be carefully qualified. What is at issue is the changing significance of knowledge, the varying 'mixes' and types of knowledge, and the routes through which they flow into the production of any commodity. For example, ALLEN (2002, 39-40, emphasis in original) emphasises "the symbolic basis of *all* forms of economic knowledge". Furthermore, "different economic activities play across a variety of symbolic registers – abstract, expressive, affective and aesthetic – and combine them in ways that render sectors distinctive". Symbolic knowledge is not, therefore, confined to the production of cultural commodities, and it may have become relatively more important across a range of other commodities. Conversely, producing symbolic outputs, as with services, typically requires substantial material underpinning and infrastructure, not least in creating specific settings to enable co-presence of producers and consumers. For example, IT services require particular sorts of buildings, computers, network connections, electricity – which requires power stations, which in turn require coal, oil, nuclear fuel, or some form of ~~non~~-fossil fuel generating technology. The issue here is the complex connections between different bits of commodity production that allow the production of new "symbolic commodities" rather than the emergence of de-materialised commodities in a digitalised, weightless economy. The material basis and weight remain critical, albeit distanced from the particular sites from which flows of information and knowledge emanate.

JESSOP (2000, 2) suggests that “what is novel in the current period [of capitalist development] is the growing application of knowledge in developing the forces of production and the increased importance of knowledge as a fictitious commodity in shaping the social relations of production”. For example, one indication of this is the expanding volumes of patents awarded to companies involved in biotechnology and bio-engineering, which are positioned at the forefront of the new “knowledge economy” in which “information and ideas have become critically important economic assets” (BOWRING, 2003, 118). At least three processes are involved in transforming knowledge into a fictitious commodity, although it is important to acknowledge that these are not new to a capitalist economy but that they have increased in intensity and extent. These involve both qualitative transformations and flows of knowledge between people, companies and other organisations involved in the economy. First, the formal transformation of knowledge from a collective resource (‘intellectual commons’) into intellectual property as a basis for revenue generation (for example, as a licence or patent). Secondly, the formal subsumption of knowledge production under exploitative class relations through the separation of intellectual and manual labour and the transformation of the former into alienated wage labour, producing knowledge as an exchange value rather than as a use value. Thirdly, the real subsumption of intellectual labour and its products under capitalist control through their commodification and integration into a networked, digitised production-consumption process controlled by capital, of information produced by a firm not

for its own use (as a use value) but to sell to another to deploy in its production process (as an exchange value).

Thus the distinctive features of recent developments in circuits of knowledge and intellectual capital are seen to relate to their global reach and speed of flow within them, changes enabled by technological innovations in ICT and the deployment of different combinations of knowledge in commodity production as the role of knowledge in the economy has changed qualitatively. Paradoxically, however, the greater fluidity in the movement of codified knowledge has enhanced the significance of tacit knowledge and the key material sites in which it is produced and circulated. It is these changes in the movement of information rather than knowledge and learning per se becoming distinguishing features of the capitalist economy that are crucial. There are, however, limits to such processes. Cyberspace is not a “neutral third space” between capital and labour, market and state, public and private. Rather, it is a new terrain on which conflict between these forces institutions and domains can be fought out. Consequently, irrespective of the extent to which capital migrates into cyberspace, like all capital “it still depends on territorialisation” – that is, on materialisation in specific spaces, cities and regions. Indeed, “even e-commerce needs such an infrastructure, even if it involves a ‘celestial jukebox’ sending digitised music on demand” (JESSOP, 2000, 4). This in turn suggests that those cities and regions in which such activities have become materialised have become pivotal and will become of still greater significance in shaping the development trajectories of capitalist economies and in

reproducing the map of uneven development. This suggests that the extent to which peripheral places can gain as a result of the new developmental trends may be severely circumscribed. In turn, this calls into question claims that such policies constitute the panacea for the problems of such places.

The Knowledge-based Economy, version I: the creation of a 'workshop of the world'

It is often remarked that north east England was once one of the 'workshops of the world', a region transformed in the nineteenth century into one of the birthplaces of industrial capitalism, a major site of production for key commodities and raw materials of the era of carboniferous capitalism. This remarkable transformation of the region via the creation of a new form of economy was above all based upon invention, the creation of new knowledge, typically initially in the form of tacit knowledge as a result of the practical activities of engineers and working men, and its deployment in production via a range of radical product and process innovations in chemicals, coal mining, the production and use of metals in making ships, armaments, power stations and equipment and other complex commodities linked to the production of the means of production (MCCORD, 1979; NORTH, 1975).

Thus this emergence of new forms of economic activity based around radical product and/or process innovations and their deployment in commodity production was nothing less than the creation of a new KBE. Newly produced scientific knowledge was combined with existing knowledges, both codified and tacit, to form the epistemic basis of a new regional economy via translating new knowledge into radical innovations. The interplay of codified and tacit knowledges, of new and existing knowledges, and their resultant emergent effects, decisively shaped the competitive advantage of firms in the region. As such, the region became a pivotal location in the development of industrial capitalism, centred on major capitalist enterprises. These were typically linked into 'coal combines' via a variety of economic and non-economic relations and ties and deployed strategies of strong Schumpeterian competition, based on first mover advantage and oligopolistic market domination, if not quite monopolistic control of markets (HUDSON, 1989).

Moreover, this emergent KBE was based on a combination of endogenous capital and locally-produced knowledges with imports and inflows of both human labour (from Ireland and other regions of the UK), knowledge and raw materials (for example, by the 1870s, iron ores from Spain: BEYNON et al, 1994) and resulted in substantial outflows and exports of commodities and capital to the markets of both formal and informal Empires. For example, around the turn of the twentieth century, around 80% of all capitalist ship production emanated from the region. In these senses, it was from the outset a global region, deeply involved in the production of globalised relationships and global flows of capital. However – and

this is a key point - all stages of the production process in these varied industries, from R&D and the production of knowledge and its translation into new processes and products to material commodity production, were located in the region which became, for capital at least, the centre of a virtuous spiral of accumulation and growth¹. Moreover, high level scientific and technical knowledges to support such R&D activities were underpinned by the development of Durham University's activities in Newcastle, as Armstrong College focussed on activities as engineering, with a direct feedback to the economy via the transfer of codified knowledge about production processes and products (pre-figuring proposals and developments around a century later: see below).

The depression of the 1920s and 1930s had severe impacts upon this 'old' industrial economy ('old' in the sense that it no longer enjoyed its former first-mover advantage as innovations had diffused internationally). Nonetheless, it managed to survive well into the 1960s, with a continuing although more selective and sporadic history of knowledge creation, R&D, and radical product and process innovation (much of it associated with the activities of ICI on Teesside). The inter-war depression was characterised by severe job losses but, in general (there were exceptions: colliery closures in west Durham and the closure of Palmer's Jarrow

¹ Two qualifications are worth making regarding the growth process. First, there were often wild cyclical fluctuations around the upward trend. Secondly, the main beneficiaries of growth were local capitalists and their allies; working people and their families were commonly living in poverty, especially in cyclical downturns.

shipyard by National Shipbuilders Securities: see WILKENSON, 1939), it did not lead to large-scale capacity closure. While fixed capital was moth-balled and to a degree devalorised, in general it was not physically and materially destroyed. Consequently, when demand recovered the region's industrial economy could respond and revive in terms of output and employment, though less so in terms of fresh fixed capital investment. In a way that typifies the contradictions of capitalist development, the regional economy was pulled from economic crisis by the combined effects of the war economy and post-war reconstruction. As a result, the sclerosis that had set into much of the economy did not become visible in terms of indicators such as output, employment and unemployment until the late 1950s, initially in coal mining and shipbuilding, but then in a progressively wider range of "traditional" industries.

However, the design and R&D teams of the major shipbuilding and engineering companies (for example, Swan Hunter and Reyrolle Parsons) and especially chemicals (ICI at Wilton alone employed more than 200 PhD research chemists) in the region remained intact throughout this period; some even expanded. Indeed, the concentration of highly qualified research chemists at ICI can be seen as emblematic of the way in which knowledge creation had become intentionally designed to underpin commodity production and the process of capital accumulation. Moreover, to the extent that knowledge became patented and licensed to others, knowledge itself became capitalised, a commodity to be traded, bought and sold in markets. Nonetheless, in general this 'old' industrial economy

had lost its radical innovative edge and the competitive advantages once conferred by its distinctive knowledge bases.

There were a number of reasons for this, related to private- and public-sector decision-making processes. First, there were changes in corporate strategy: as commodities became mature, companies either went out of business due to intensified global competition or switched product and/or process and/or location and moved their R&D and related activities out of the north east (a process that was still continuing into the 1990s: PIKE, 2005). This locational switch was an integral part of changes in the international division of labour, and the rise of new production centres in other parts of the world. Secondly, nationalisation led to the centralisation of R&D in coal, energy and steel in locations outside the region. Privatisation of formerly nationalised industries had the same effect: the move by newly-privatised British Gas of its R&D activities from Killingworth to the south east in the 1990s was the last in a series of such relocations. One critical consequence of these moves was that the potential for translating high level knowledges and skills into new activities in the region and a resultant transformation of the regional economy onto a new knowledge base was lost.

Interestingly, however, in one or two rare cases such a transformation of existing firms onto a new knowledge base did occur, registered in development discourse in the region (which is discussed more fully below) by recognition of the emergence of new clusters from the late 1990s. For example, on Tyneside this led

to the emergence of a sub-sea technology cluster, evolving from offshore activities that in turn had developed from previous shipbuilding activity. A second example emerged in the Tees Valley, with a cluster of high-level globally competitive engineering service firms evolving from firms that previously had been builders of bridges, railways and related products but that now sell their knowledge and expertise in design and project management in a global market. These transformations are a product of the link between two sets of processes. The first relates to the creation of “redundant” or “slack” resources (human, technical and infrastructural) left behind by the decline of traditional industries. The second focuses on the processes of corporate and sectoral re-organisation, the identification of new market opportunities, the selection of promising avenues of development, the organisation or creation of a new architecture of knowledge production and utilization and the discovery of new methods of production organisation to enable the emergence of a new technological and/or market trajectory to absorb this slack and put it to productive use.

While recognising the potential significance of these examples of successful adaptation for development strategies in the region, the fundamental point is that these remain just that – rare examples of a counter-tendency². The dominant effect of eroding the competitive edge provided by the knowledge bases that

² There was no inevitability about this, however. In other similar regions such transformations took place on a much larger scale. For example, in the Ruhr there a significant new cluster of environmental technology companies emerged from the declining coal and steel sectors.

underpinned the growth of the region's "traditional" industries is that of decline – in capacity, output and jobs. This was disclosed and registered as a profound regional deindustrialisation, with all the socio-economic and political difficulties that it brought, Recognition of this led to attempts to create a different sort of regional economy, with a different knowledge base.

The Knowledge-based Economy, version II: the branch plant economy and beyond

As the "old" knowledge-based economy began to exhibit signs of decline as early as the 1930s, , there were moves to develop new forms of state policy that would help construct an alternative form of economy based around inward investment in 'new' – to the region - industries. This policy shift was initiated by established capitalist concerns which sought to construct a state regional industrial policy to protect their own interests and to counter the threat of social unrest as a result of rising unemployment and poverty. After a period of relative quiescence due to the effects of the war economy and post-war reconstruction in stimulating demand for products made in the north east, this policy of industrial diversification was prosecuted with renewed vigour from the late 1950s once it became clear that the decline of the region's old industrial economy was secular rather than cyclical.

While a strengthened central government regional policy had been in place from the late 1940s, it had been implemented very selectively and with little enthusiasm or vigour in the north east. Specifically, only branch plants and back office activities

that would not compete on the labour market with established industries (coal mining, steel, shipbuilding and so on) were permitted to locate in the region because their outputs were seen as vital to post-war economic recovery and national economic performance in the 1950s (HUDSON, 1989). Blocking the entry of potential competitors for male labour was crucial in ensuring that their labour forces remained intact and production endangered by labour shortages. As a result, such new branch plants as were permitted were concentrated in sectors such as clothing and consumer electronics, in which firms were primarily seeking to recruit female labour, while the expansion of public services such as education and health was also based upon enhanced female activity rates.

However, once the “old” industrial economy was seen to be in secular decline, political-economic priorities changed. Not only was there a perceived need for alternative sources of male employment in the north east but unbalanced regional growth became recognised as a major impediment to achieving faster non-inflationary national economic growth. The solution to these problems was seen to lie in a more vigorous implementation of a further strengthened central government regional policy, attracting new investment and jobs to the north east (and like regions), creating new sources of male employment there and reducing inter-regional differences in economic performance and growth rates.

The emphasis in building a new form of regional economy around branch plants to a degree also reflected the emerging academic literature on corporate

reorganisation and the new ways in which companies were using spatial difference as part of their competitive strategies as new geographies of production and spatial divisions of labour were emerging. Regional policy sought to use this and attract particular routine branch plant functions to the north east. This new branch plant economy required different sorts of knowledge and skills, with little or no demand for people with high level decision making, design and R&D skills. Instead it required people with more basic knowledge and limited qualifications but willing to accept the disciplines of Taylorised production in branch plants and back offices. This was still a KBE, but one based upon the import of codified knowledges as to how to organise routine production activities and requiring a limited range of skills and expertise within the region. Not only was there a much lower level of demand for people with mental and non-manual skills but such manual jobs as were provided were typically unskilled or semi-skilled and required different types of social and technical skills and competences to those of the 'old' industrial economy. As a result, there were often problems in getting men who had worked in coal mines, steel works, shipyards and engineering works – above all those engaged in skilled work, with occupationally specific skills, often based upon tacit knowledge acquired 'on the job' - to work on factory assembly lines in the new (to the region) consumer goods component production and assembly plants, in the paper processing assembly lines of back offices, or in the new public service activities of education and health, with their emphasis upon caring and cleaning work. This was a key reason why this second version of a KBE in the region was

associated with increased female employment and with feminisation and a shift in the gender composition of the labour force.

This shift in the industrial and occupational structure of the regional economy, and its enabling and requisite knowledge bases was also facilitated by a variety of state-sponsored and/or organised training schemes to ensure the availability of workers with appropriate knowledge and skills. While the skill levels required of the 'new' activities were generally modest, they were nonetheless skills (technical, personal, social and communication skills) that were not readily available in the region's labour market. Thus part of the offer to potential inward investors was that training would be provided to ensure that suitably qualified labour was available in sufficient quantity. This included specific training schemes for assembly line workers in the new automobile and electronics companies and later for the substantial numbers recruited by a variety of call centres. However, the rigorous recruitment criteria of the new companies, in a labour market in which supply far exceeded effective demand, meant that participation in these training schemes was no guarantee of employment – for example, at one point in the early 1990s Nissan had over 33,000 applications in response to advertising the availability of 600 new jobs (HUDSON, 1995)³.

³ State training schemes were by no means new. Local technical colleges (and later polytechnics) provided courses for engineers and skilled manual workers required by the 'old' industries. Training courses were organised in response to the requirements of earlier rounds of branch plant investment - for instance in consumer electronics in the

The new manufacturing branch plants, increasingly a result of inward investment by multi-national corporations, were by-and-large demonstrably 'global outposts', subject to capacity cutbacks or closure because of decisions taken in distant locations, with often devastating effects in terms of job loss in the north east (HUDSON, 1995). Some closed very quickly, others never even opened (such as the Siemens integrated circuit factory on north Tyneside), and on average the lifespan of branch plants shortened as more and more locations competed for them. Despite claims about changes in the character of inward investment and the emergence of embedded branch plants, with deeper commitments to the region and wider mandates (for example, to include limited incremental R&D activity), in practice such plants are rare and hard to find. While Nissan has been located in the region for 20 years and elements of its supply chain have co-located in the north east, its factory at Washington New Town lost its mandates for R&D and some aspects of purchasing following merger with Renault. Nissan is therefore both a rare example of a plant that has remained for two decades, which sets the standard in terms of labour productivity and product quality for other plants in Europe and north America and by the standards of the north east provides well-paid and stable manufacturing employment, but also one which has become less, rather than more, embedded with the passage of time.

1960s (HUDSON, 1980). However, then, the probabilities of acquiring employment requiring these newly-acquired skills were much higher.

While public sector back office activities of government departments have proved relatively stable, the later re-location of private sector back offices has exhibited greater volatility. Equally, while there has been an influx of call centres and particular types of business process activity across a wide range of sectors, these too are susceptible to closure and re-location in an intensely competitive global market as locations in Canada, China, the eastern länder of Germany, India and Russia seek to attract such labour-intensive (for now at least) activities. Although these are mostly “white collar” non-manual jobs, they too require only basic knowledge, skills and competencies, with often a greater premium on communication, personal and social rather than technical skills.

By the late 1970s it was becoming clear that the dominant policy approach of attracting inward investment was failing to provide an adequate answer to problems of unemployment and lack of work in the region. The response to this was to shift the emphasis in policy to encouraging endogenous growth and the creation of self-employment in an emergent enterprise economy (HUDSON, 1998). This spanned a range of manufacturing and service activities, including tourism – the unifying factor seemed to be firm size rather than any more coherent shared characteristics. However, such a policy shift also valorised a new set of social and technical skills and competencies – summarised in terms of “entrepreneurship” and “enterprise” – but these proved to be in short supply in the region. Put another way, the policy switch to SMEs was predicated on untenable assumptions as to the availability of particular sorts of knowledges and skills in the region – and was

silent about the need to devise an appropriate demand-side policy response. When this conception of policy failed in practice to produce economic regeneration, the stage was set for a different policy-led version of the KBE to emerge, centred on new forms of knowledge and sites of knowledge production, diffusion and transmission. In this, the emergent regional policy was influenced by growing emphasis in parts of the social sciences on the (alleged) emergence of a 'new' KBE and on the primacy of particular socio-spatial formations of this economy. It was also influenced, decisively, by the dominance of neo-liberal perspectives on the economy that transcended party political divides and emphasised the role of competition, markets and self-reliance in shaping the fate of people and places

The Knowledge-based Economy, version III: New Labour, regional devolution and new science-based industries and knowledge transfer from the region's Universities

While the election of the New Labour government in 1997 in many ways was marked by continuities with the neo-liberal policies of its Conservative predecessors, in other ways it registered important changes. In the context of policies for the regions in general, and the north east in particular, these changes reflected the convergence of three different sorts of pressures, two 'economic' and the third 'political'. First, there was recognition of a persistent national productivity

'gap', especially between the UK and USA, reflecting lower levels of R&D and high level 'knowledge-based' activities. This was linked to policy makers' changing understandings of the determinants of economic growth that placed greater emphasis on the quality of ideas, innovation and knowledge (for example, AGHION and HOWITT, 1998). This influenced national government policy and in turn filtered down to shape emerging conceptions of regional development policy (as is shown below). Secondly, there was recognition of continuing problems of regional uneven development as the north east persistently performed at the bottom of the regional economic performance league tables. This strongly suggested that previous economic development models (in all their varied forms) simply had not had, were not having and would not have their intended effects. Thirdly, there were increased pressures for growing regional devolution in parts of both central government and in some regions. These pressures were particularly prominent in the north east among certain business and political elites (and the reasons for this are discussed further below). The newly elected government saw the possibility of dealing with all three sets of issues simultaneously via new innovative devolved regional organisations in England, Regional Development Agencies (RDAs: the Celtic fringes had had their own stronger versions of such institutions for many years).

The RDAs (along with appointed Regional Assemblies) were launched in the context of various national initiatives intended to help resolve the national productivity problem via encouraging knowledge transfer from Universities to

regional economies and promoting an entrepreneurial culture in higher education (for example, establishing regional Science Enterprise Centres). This drew heavily on one particular conception of scientific knowledge and its translation into the economy (ETZKOWITZ and LEYDESDORFF, 2000; LUNDVALL and MASKELL, 2000) and was a process that was to be heavily influenced in the north east by the subsequent involvement of international consultants ADL (see below). Problems of poor regional economic performance were to be solved by, literally, capitalising and capitalising on knowledge produced in the regions' Universities, facilitating the production of more knowledge intensive and higher value added commodities, principally in manufacturing but to a degree in services, reflecting the increasing de-differentiation of manufactures and services. Enhanced economic performance would result from both capitalising upon on-going scientific research in universities and via specifically seeking to shape their research activities and agendas, especially in science and engineering. This potentially raised difficult issues regarding the autonomy of universities and the determinants of research, the production of scientific knowledge and the ownership of IPR arising from that research. Implicit in this approach to economic development policy was a territorially-based model of knowledge production and dissemination, centred on a concept of regions as bounded and contiguous territories and regionally-defined organisational structures and intra-regional flows. Universities in the region responded to these schemes (DUKE et al, 2006). Individually and collectively, often in collaboration with other regional partners, they explored ways to encourage knowledge transfer to companies and public sector organizations (such

as the NHS) in the region and commercialise the results of their scientific research. At the risk of (over) simplification, these may be categorised as falling into one of four types: research centres, collaboration and consultancy; intellectual property (IP) transactions; promotion of spin-offs, incubators, science parks; training and labour mobility.

While these national or UK-wide initiatives evoked specific responses within the north east, they also created tensions, both nationally and specifically within the region. The Treasury and Department of Trade and Industry (DTI) were primarily concerned with productivity and national economic performance, seeking to use these national initiatives to narrow the gap in productivity levels between the UK and its main international competitors and ease the transition to a high productivity, new KBE. They saw the prime role of RDAs as the elimination regional productivity differentials and the barrier that these posed to non-inflationary national economic growth⁴. Not all central Government Departments saw the role of RDAs in this way, however. The Office of the Deputy Prime Minister (ODPM,) had a much stronger commitment to regional devolution per se, a cause. Long championed by the 'Old Labour' Deputy Prime Minister John Prescott, whose 1983 alternative regional strategy was based upon greater regional devolution, regional

⁴ Those with a sense of history – and irony – pointed out that this was precisely the argument used in the 1950s by Macmillan's Conservative government to justify introducing a revived and strengthened central government regional policy and soon afterwards specific initiatives for the north east of England: HUDSON, 1989.

development agencies and elected regional authorities. As a result, there were visible tensions within national government over the role of the new RDAs between the Treasury/DTI and the ODPM.

Equally within the region there were divisions between those who wanted such devolved Agencies as part of a process of regional democratisation that would – inter alia – allow the formation and implementation of more effective regional development strategies and those who opposed them. These disputes reflected different conceptions of ‘the region’ as a social actor, differences as to the appropriate site of policy formation, and divergent views as to which social interests should be prioritised in regional development policies. The opposition was something of an unholy alliance, bringing together three distinct factions. Firstly, those who opposed unelected RDAs because they were anti-democratic. Secondly, those who opposed the proposed form of elected RDA because it was simply too weak to be effective (an offer decisively rejected in a regional referendum in 2004). Thirdly, those who opposed an elected RDA because they saw it as disrupting existing and well-established organisational arrangements that originated in the 1930s and subsequently evolved into a succession of organisations ‘in and for’ the region. These organisations were manned (the term is deliberate) by groups drawn from a small political and economic elite and

served their interests and those of their various constituencies (HUDSON, 1989; 2006a; 2006b)⁵

However, the establishment of the Regional Development Agency, (ONE), in 1999, was a significant extension of past policies. Its main task was to forge a regional economic strategy but within strictly defined parameters as to what constituted the economy ('the capitalist mainstream'), what constituted development (increases in productivity and GDP/caput) and as to the targets that had to be met and the tasks that needed to be achieved to ensure this. These constraints were not unique to ONE, applying to all the English RDAs. However, especially when combined with the influence of a small set of consultants who tended to be involved in the production of these strategies and who were selling essentially the same generic model of development to all regions⁶, they led to the counter-intuitive result that their various economic development strategies bore a close generic resemblance to one another, despite the very different regional contexts that they were supposedly addressing. As such, the creation of the RDAs and the ways in which they were steered and monitored by central government can be seen as one

⁵ They included the Northern Economic Planning Council set up in 1966, the Government Office for the North East (GONE), established in 1993 to bring together central government activities and operations and the delivery of central government policies in the region within a more coherent framework and the appointed Regional Assembly created in 1999.

⁶ There are strong echoes here of THRIFT's (2005) emphasis on the significance of the global "circuit of cultural capital" and of the pervasive influence of a small set of consultants and their associates.

expression of a new form of governmentality, of governing 'at a distance', apparently devolving authority and power to regions but in practice tightening the grip of the centre over the regions (HUDSON, 2007).

The emergent regional economic strategy in the north east had a clear and explicit focus on promoting a new sort of KBE - in part a product of a recognition of the inadequacies of previous forms of policy, in part of a growing international emphasis upon a certain sort of 'knowledge-based economy as the route to future prosperity among international organisations such as the OECD and the EU with its Lisbon agenda. The region's universities were assigned – or, perhaps more precisely, sought for themselves - a key role in this as important regional actors, centres of research excellence and producers and disseminators of knowledge. University laboratories were to become key nodes of 'high level' knowledge production, predominantly in the form of codified knowledge, and its transfer to private sector companies and public sector organisations in the region. While partly a response to pressures from the universities, this was also a realistic reflection of the absence of feasible alternatives to fill this role as key nodes of knowledge production and dissemination. By the late 1990s there was very little private sector R&D activity left in the region and there were no major government or public sector R&D facilities there. The north east regional economic strategy (ONE, 1999; see also 2003) specifically focused on universities as the prime mechanism for rebuilding the knowledge base, identifying 'Placing universities and colleges at the heart of the Region's economy' as one of six main priorities.

However, there was no serious consideration of the knowledge transfer process, of the necessary relations between codified and tacit knowledges in this process, and of how new codified knowledge would be used in combination with existing tacit knowledge. Rather it was simply assumed that the production of such knowledge in universities and its (non-problematic) translation into the regional economy as a source of new products, processes and profits would act as a necessary - at times it even seemed sufficient – condition to set in motion a virtuous spiral of growth in the region. As a result, putting the region’s universities at the heart of the regional economic strategy in this way was not without risks. From ONE’s point of view it left its economic development strategy – with its strong claim that it would generate 90,000 jobs in the new KBE (whatever that in practice would mean) in ten years – heavily dependent upon universities filling their assigned role in circumstances in which they had little experience of, or track record of success in, such translational activity. From the point of view of the universities, it created a weight of expectation as to their capabilities in knowledge transfer. Whether this was reasonable or realistic remained unclear, not least because successive UK national Innovation Surveys reveal that only 2% of companies regard universities as a highly important source of information (Miles and Daniels, 2007, 9). Nonetheless, in the end, the KBE – or, more precisely, the specific form of its elaboration in ONE’s strategy - came to be seen as a politically neutral leitmotif to which all those in the region who were ‘partners’ in the strategy could sign up (after all, who could be against knowledge?).

This still left unresolved the question of how to translate research from the universities to produce the desired regional KBE. In seeking to answer this question, the production of the regional economic strategy became linked into the debate on 'clusters' and the promotion of Porterian clusters as a key element in the process of knowledge transfer and successful regional economic development (although in fact ideas of cluster-based development were being floated in the north east in the 1960s: see HUDSON, 1989). Government White Papers in 2000 and 2001 emphasised the role of RDAs and of Universities in underpinning economic vibrancy via support for clusters and innovation (DTI, 2000; DTI/DfEE, 2001), uncritically accepting claims that territorial clusters were the best – indeed the only – feasible economic development model and failing to explore alternatives based around different spatialities and forms of inter-firm relationships.

However, the question of which regional organisations could perform the role of broker and translator of knowledge from universities to economy still remained unanswered. The 2001 White Paper proposed establishing University Innovation Centres (UICs). However, in parallel to these and other national initiatives and schemes, ONE set out to create its own set of new regionally-specific intermediate organisations as an integral component in its emerging regional economic strategy. Each English RDA was required to develop an innovation action plan as part of its initial guidance from government, building upon existing innovation strategies developed through the government regional offices, often assisted by funding from EU programmes. However, the resources available to support this

were very limited (between £250k and £440k per RDA per annum) while RDAs were highly constrained in their use of central government funds because funding streams were locked into central government programmes delivered in the regions. Furthermore the legacy of historically low levels of government R&D expenditure in the regions was seen as a key obstacle in moving towards a new KBE. As ONE (1999, 59) emphasized, '[t]here is a widespread belief throughout the Region that the Government must direct more Treasury funded research to Universities outside London, particularly to the North East. This is essential to underpin the Region's approach to promoting knowledge transfer'.

One suggested approach to knowledge transfer was via Advanced Centres of Excellence (or Centres of Discovery), which like the, then new, International Centre for Life would combine research, exploitation, spin-offs, educational outreach, training and public understanding of science. Four additional Centres were proposed, but without specifying technology areas or delivery mechanisms or locations. To help take forward the debate and clarify the potential role of such Centres, in early 2001 ADL was commissioned to review the research base in the North East in relation to current and future needs of key industry clusters. The ADL Report (August 2001) combined lessons learned from a parallel study in the North West with refinement of previous work in the North East and provided a clear template for the region. The response to the report (ONE, 2001) was very rapid – indeed so rapid that it seems not unreasonable to assume that the response had already been decided ahead of the report. Submitted to the DTI in September

2001 It incorporated most of ADL's recommendations. The core of the 'Strategy for Success' was the formation of a Science and Industry Council (established in December), a regional exploitation agency NStar to provide access to finance, proof of concept investment and commercialisation advice and assistance and five 'Centres of Excellence', each to be established as non-profit companies and located in different parts of the region. The five Centres would focus on life sciences (Centre of Excellence for Life Sciences - CELS), new and renewable energy technologies (New and Renewable Energy Centre - NaREC), nanotechnology (Centre of Excellence for Nanotechnology, Photonics and Microsystems - CENAMPS), digital technologies (Codeworks) and process industries (Centre for Process Industries), this last based on the legacy of ICI's former R&D activities on Teesside (see CHAPMAN, 2005) - a mixture of technologies novel to the region and existing regional industrial and academic strengths. .

These five Centres of Excellence were intended to link the region's universities' research base - concentrated in Durham University and the University of Newcastle - to business, forming a bridge between their scientific research and industrial commercialization and the capitalisation of knowledge produced through research, while also recognising the need to forge extra-regional links. ONE provided pump-priming resources but each Centre was required to plan for self sufficiency from commercial and investment income within five years. Whether prioritising short-term concerns with financial self-sufficiency over longer-term

concerns with qualitative regional economic transformation was realistic and sensible remains a moot point. Overall it was estimated that the RDA would invest £200 million over five years while aiming to leverage a similar level of investment from EU and other national programmes (ONE, 2003). Each Centre evolved a distinct strategy, reflecting the characteristics of the technologies and sectors it supported and the legacies of existing Centres and activities. In addition Nstar sought to invest £33m in innovative technologies through proof of concept funding. However, in total and in relation to the task of shifting the regional economy onto a qualitatively different developmental trajectory, this was very modest funding.

Following an appraisal of the Strategy for Success by the Regional Assembly in summer 2004 as part of its 'scrutiny' role, ONE reviewed the programme, identifying three Centres as presenting the greatest potential for future economic growth. Accordingly, the programme was restructured around the three 'pillars' of Healthcare, Process Industries and Energy and Environment, associated respectively with CELS, CPI and NaREC. Each pillar was to be directed by a Leadership Council, responsible for setting a strategic vision and overseeing delivery of the project, and incorporate industrial clusters and other 'delivery partners' (including universities). ONE anticipated that each pillar could potentially contribute £2bn towards closing the North East's perceived £9bn productivity gap. The remaining two Centres (CENAMPS and Codeworks), along with NStar, the Northern Way Design Centre (see below) and a management skills programme provided via the Regional Skills Partnership, were to have more of a generic

underpinning and complementary role, supporting activity across the three sectoral pillars. Reflecting its aim that the Pillars should become self-financing, ONE proposed a two tier structure, with their public duty elements of activity financed by the Agency, and the remaining income generating elements run through a separate trading arm, responsible for commercialisation.

The emergence in 2004 of the Northern Way growth strategy involved ONE in discussions with two other RDAs (the North West and Yorkshire and Humberside) around a wider pan-regional strategy for investment in science in collaboration with eight research-intensive universities in the North, known as the N8. However, the scale of additional funding was again modest – a “growth fund” of £100 million over the period 2005-2008 spread across the three RDAs, with only £10 million targeted at knowledge transfer and science and innovation priorities (NORTHERN WAY, 2005). Clearly there is limited scope for new initiatives within these budgetary limits. In addition, Newcastle was one of three cities were designated as science cities. The RDA, Newcastle City Council and Newcastle University acquired a development site, ‘science central’, near to the University and intended to be a new translational research campus, grounded in a place-bound concept of ‘science city’. This, however, generated visible tensions between those who saw ‘science city’ in this way, eliding it with ‘science central’, and those who envisaged ‘science city’ as a distributed regional network, encompassing other key nodes of scientific knowledge production and research, both new (such as NETPark in

County Durham) and more established (such as CPI on Teesside, which merged with CENAMPS in 2007),

How successful these various initiatives will be in facilitating the emergence of a new KBE and closing the inter-regional output remains to be seen. There is some initial evidence of the 'pillars of excellence' developing as nodes in knowledge flows (TULLY et al, 2006) and innovative firms in the north east being more likely to exploit contacts with Universities as compared to other English regions (Johnson and Reed, 2008, 24-5) but this is some way from the effective translation of results from scientific research into the cognitive basis of a 'new' regional KBE. However, there are continuing uncertainties as to the development of 'science central' and the time frame in which this might happen and, more generally, it remains to be seen how effectively 'science city' as well as the 'pillars of excellence' will evolve as mechanisms for delivery of the transition to a new regional KBE. Moreover, influential analysts have cast doubt on the wisdom of relying on developing new industries on the basis of new knowledge and novel technologies, seeing it a high-risk and likely to fail and arguing for a different strategy that sought to build more upon the legacies of previous versions of the KBE (OECD, 2006).

Conclusions and Some Questions

By the 1990s it was abundantly clear that the various policies pursued in the north east had failed to have their intended effects, of producing a stronger, more diversified and resilient regional economy. The region continued to bump along at the bottom of league tables of regional economic performance, with persistent high levels of multiple deprivation and sharp intra-regional socio-spatial disparities in well-being. This encouraged – some might say politically necessitated – an urgent search for fresh policy approaches. Clearly the policy initiatives at both national and regional levels since the late 1990s, heavily influenced by new claims as to the significance of knowledge of particular sorts in shaping success in the contemporary economy, represent an ambitious attempt to remedy the situation and shift the region's economy onto a qualitatively different developmental trajectory, seeking both to position the region more advantageously in relation to the (allegedly) emergent 'new' economy while echoing its nineteenth century 'golden age' but on the basis of a much more consciously managed process of knowledge production and translation. The aim is to facilitate the production of new commodities, with unique selling points and dominant market positions, and/or to enhance the knowledge intensity and move up the value chain in producing existing commodities via capitalising (on) knowledge produced in the region's universities and translated through new intermediary organisations, the Centres/Pillars of Excellence.

The success or otherwise of these initiatives raises important questions. First, are they working – or will they work in future – in their own terms, to meet their defined

goals? The answer to these questions remains as yet uncertain. Not least, this is because knowledge, no matter how original and novel, remains only one determinant of successful commodity production, corporate profitability and successful regional regeneration and too much weight may be being loaded onto knowledge per se as an agent of economic transformation. While there have been some promising signs, it is by no means certain that this developmental strategy will succeed. It is, for example, difficult to see that it will meet the target of 90,000 jobs to be created in the new KBE and questions remain as to whether the region's universities will be able to perform the key role of nodes of research, knowledge production and dissemination assigned to them. There will undoubtedly be knowledge transfer from the universities but it remains to be seen whether this will be on the scale required to transform the regional economy – not least because of lack of demand and the limited capacity of the region's economy to absorb such new knowledge and associated innovations. Moreover, there are unresolved tensions between the production of scientific knowledge as a research goal per se – which may then open opportunities for commercial exploitation, or then again may not - and the consumption of such knowledge production to the pressing imperatives of capital. In short, it remains an open question as to whether the current round of policies in the north east will have their intended effects in facilitating the emergence of a KBE, especially as they are based in a limited and partial – even naïve – view of the knowledge transfer process (see also OECD, 2006). For as Miles and Daniels (2007, 21) note, “Increasingly it is not individual companies that compete but trans-border supply chains of integrated companies

positioned in global markets. In the face of such massive unbundling', whither a national innovation strategy (let alone a regional strategy)?" This clearly calls into question the efficacy of territorially- bounded innovation strategies.

Secondly, the region is seeking to pursue these policies in an increasingly competitive global environment, as cities, regions and national states all compete for investment. Many places that have gone through the same sequence of growth and decline as north east England are now seeking to develop knowledge-based economies, centered on the same restricted set of high technology activities and sectors. The pursuit of science-based – even science led - investment in sectors such as biotechnologies and nanotechnologies is rife. However, these are also broad and diverse sectors of activity. One implication of this is that “the way forward is to nurture ‘niche positions’” (Miles and Daniels, 2007, 4). Consequently there is a need to identify precise niches and spheres of activity in which companies in north east England could, in principle at least, develop first mover advantage and significant competitive advantage and then to develop equally precisely targeted strategies to support their further successful development. There are one or two of initiatives that suggest developments along these lines. The first is the North East Stem Cell Institute (NESCI) is a unique interdisciplinary collaboration between Durham and Newcastle Universities, the Newcastle Hospitals NHS Foundation Trust, the International Centre for Life in Newcastle and ONE NorthEast. It seeks to underpin cutting-edge research in stem cell biology and translate the results of this research into cost effective and ethically robust health solutions to ameliorate degenerative diseases, the effects of ageing and

serious injury. This in turn will provide a potential basis for commercialising the results of research and provide the basis for the emergence of innovative new products and services in which firms in the region will have first-mover advantage⁷. A second example is the Plastics Electronics Technology Centre (PETeC) at the North East Technology Park (NETPark) in County Durham. Following its merger with CENAMPS in 2007 and working in collaboration with multinationals and leading research bases, and both drawing on and facilitating cutting-edge research in the region's Universities, the Centre for Process Innovation (CPI) is establishing PETeC as an internationally recognised facility for the development and commercialisation of printed electronic devices and flexible functional materials. Plastic electronics will form the basis for a completely new range of applications across a broad set of markets including electronic consumer goods, automotive, aerospace, energy, retailing, food packaging, imaging, healthcare and fashion. Potential applications include smart packaging, real-time newspapers, intelligent signage, point-of-care medical diagnostic devices, novel drug delivery devices, smart sportswear, fashion clothes and accessories, printed electronics for consumer products, flexible solar cells and solid state lighting. Providing world-class facilities, services and expertise at the hub of a UK-wide network in plastic electronics, PETeC is becoming the national prototyping operation for these emergent new materials. It will establish the region as a global leader in the application of plastic electronics and will enable the development of internationally competitive, knowledge intensive activities, with

⁷ For further information, see <http://www.ncl.ac.uk/corporate-web-development/about/item/nesci>

the potential for both new and established firms in the north east to derive first-mover advantage in these innovative new materials and products manufactured from them.

However, this degree of sophisticated targeting has not, as yet, developed more generally; nor have its wider implications been thought through in a systematic way. For example, it could have important implications for the types of university research that would be supported – and for those that would not be, with potential longer-term dangers of narrowing the gene pool in terms of the diversity of research in universities. Moreover, even if there was to be this degree of sophisticated targeting, it is important to remember that these policy-led attempts to both use the results of existing university research in regional innovation strategies and indeed shape such research in future so that it is directly linked to the needs of capital are constrained within the parameters and limits defined by capitalist relations of production. Consequently, there are precise limits to such processes, circumscribed by the limits to capital itself (HARVEY, 1982; JESSOP, 2000) and by the limits to political strategies that seek to influence the form of capitalist development, which remains inherently and unavoidably uneven. Seeking to commodify existing knowledge and/or to produce future knowledge in commodity form cannot escape the contradictions inherent to processes of capitalist development and commodity production. Two are of particular relevance here: first, such development typically has unintended as well as – or instead of – intended results; secondly, such development is dynamically uneven and typically erodes the bases of its success over the longer-term. This is something that

proponents of approaches that prioritise knowledge, information flows and learning per se are prone to ignore.

Thirdly, however, if the strategy does succeed in facilitating the emergence of a new KBE that, for a while, is both quantitatively and qualitatively significant in its transformative effects on the regional economy, there are two qualifications to be borne in mind. The first is that the historical-geography of the north east economy suggests that even when there was substantial indigenous R&D activity in the region, this was no guarantee of continued long-term economic success in/of the region. Profits made in the region were invested elsewhere, in other places and sectors (for example, railways in south America and banks in London). As the miners' checkweighman George Harvey put it in 1917, "capital knows no county"; no doubt if he were to come back now, he would emphasise that capital knows no country, indeed no continent. The second qualification is that even a successful KBE as envisaged within current policy discourse regionally and nationally would fail to engage large numbers of people in the region, for two reasons: first, it would generate insufficient jobs relative to the number of people seeking work; second, there would be great selectivity on the part of employers as to who would get those jobs. This strongly suggests the need for a more plural and heterogeneous conception of the economy, of development and of relevant knowledges in the context of a regional development strategy in the north east (and like regions). These are essentially theoretical tasks but the key issue is not so much re-theorisations per se (vital though that is) but rather which theoretical conceptions

become dominant – even hegemonic – in policy discourse and practice and in politics. Most fundamentally, there needs to be acceptance of a broader conception of the KBE to encompass a wider range of activities and valorise a greater range of knowledges. There is a pressing need to recognise that all forms of economic activity are knowledge-based and to embrace a more heterodox and plural concept of the economy, to acknowledge that there is – of necessity – still a place for the branch plant economy alongside an emergent more sophisticated ‘knowledge based’ economy. More than that, however, it is vital to acknowledge the presence of a social economy and an informal economy that will be crucial to any sustainable development strategy for the north east since the scale of employment creation in the formal economy, whether in its branch plant or ‘knowledge-based’ variants, will simply be insufficient to absorb all those seeking work in the region. There is some evidence of growing recognition of such points in ONE’s evolving approach to its regional development strategy although it remains uncertain as to how much weight will in practice be attached to such concerns.

Finally, although the empirical focus in this paper has been upon the experiences of one region, north east England, this raises broader questions as to how different regions relate to and are positioned in the inherently uneven process of capitalist development and the changing knowledge bases and requirements of its leading edges. For however much the emphasis switches to the significance of flows of knowledge in cyberspace as underpinning economic success and a resulting migration of capital into cyberspace, like all capital “it still depends on

territorialisation” (JESSOP, 2000, 4) – that is, on materialisation in specific cities and regions, which compete to be the sites of such materialisation and territorialisation. Thus many other regions with economic histories similar to that of north east England are pursuing similar policies to create new knowledge based economies – all believing that this will enable them to shift onto the high road of economic success, emulate the processes of self-reinforcing endogenous growth present in the key nodes of the global economy, and break with their peripheral status. Put another way, the assumption is that all regions will be able to engage in ‘win-win’ scenarios. Some may indeed succeed in making this transition. However, as the history of north east England shows only too clearly, this is a far from easy task. Moreover, it is difficult to see how all can be winners in a capitalist economy that continues necessarily to be characterised by combined and uneven development. There are therefore clear limits to the new knowledge based economy – as there were with previous generations of regional policies - in addressing issues of uneven development.

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References

AGHION P and HOWITT P, 1998, Endogenous Growth Theory, MIT Press, London.

ALLEN J, 2002, "Symbolic economies: the 'culturalization' of economic knowledge", in DU GAY P and PRYKE M (Eds.), Cultural Economy, Sage, London, 39-58.

ARTHUR D LITTLE, 2001, Realising the Potential of the North East's Research Base, ADL Ltd, Harrogate.

AMIN A and COHENDET P, 2003, Architecture of Knowledge, Oxford University Press, Oxford.

ASHEIM B and COENEN J, 2005, "Knowledge bases and regional innovation systems; Comparing Nordic Clusters", Research Policy, 34, 1173-90.

BEYNON H, HUDSON R and SADLER D, 1994, A Place Called Teesside, Edinburgh University Press, Edinburgh.

BOWRING F, 2004, "Manufacturing scarcity: food biotechnology and the life-sciences industry", Capital and Class, 79,107-44

BRACZYK H-J, COOKE P and HEIDENREICH M (Eds.), 1998, Regional Innovation Systems, UCL Press, London.

CASTELLS M, 1996, *The Rise of the Network Society*, Blackwell, Oxford.

CHAPMAN K, 2005, "From 'growth centre' to 'cluster': restructuring, regional development and the Teesside chemical industry, *Environment and Planning A*, 37, 597-615.

DTI, 2000, *Excellence and Opportunity - a science and innovation policy for the 21st century (Cm 4814)*, HMSO, London.

DTI and DfEE, 2001, *Opportunity for All in a World of Change (Cm 5052)*. HMSO, London.

DUKE C, HASSINK R, POWELL J and PUUKKA J, 2006, *Supporting the Contribution of Higher Education Institutions to Regional Development. Peer Review Report: North East of England*, OECD, Directorate of Education, Programme on Institutional Management of higher Education, Paris.

ETZKOWITZ H and LEYDESDORFF L, 2000, "The Dynamics of Innovation: From National Systems and 'Mode 2' to a Triple Helix of University-Industry-Government Relations", *Research Policy*, 29, 109-23.

HARVEY D, 1982, *The Limits to Capital*, Arnold, London.

HARVEY G, 1917, *Capitalism in the Northern Coalfield*, City Library, Newcastle on Tyne.

HUDSON R, 1980, *Women and Work in Washington New Town*, Occasional Paper Number 18 (New Series), Department of Geography, University of Durham.

HUDSON R, 1989, *Wrecking a Region*, Pion, London.

HUDSON R, 1995, "The role of foreign investment" in Evans L, Johnson P and Thomas B, (Eds.), *Northern Region Economy: Progress and Prospects*, Cassell, London, 79-95.

HUDSON R, 1998, "Restructuring Region and State: the Case of North East England", *Tijdschrift voor Economische en Sociale Geographie*, 89, 1, 15-30

HUDSON, 1999, "The learning economy, the learning firm and the learning region: a sympathetic critique of the limits to learning", *European Urban and Regional Studies*, 6, 59-72.

HUDSON R, 2006a, "Firms as political actors in processes of capital accumulation and regional development", in TAYLOR M and OINAS P (Eds.), *Conceptualising the Firm: Capabilities, Cultures and Coalitions*, Oxford University Press (forthcoming).

HUDSON R, 2006b, "Regional devolution and regional economic success: myths and illusions about power", *Geografiska Annaler B*, 88, 159-71.

HUDSON R, 2007, "Regions and regional uneven development forever? Some reflective comments upon theory and practice", *Regional Studies*, 41, 1149-60.

JENSEN M, JOHNSON B, LORENZ E, and LUNDVALL B-A, 2007, "Forms of knowledge and modes of innovation", *Research Policy*, 36, 680-93.

JESSOP B, 2000, "The State and the Contradictions of the Knowledge-Driven Economy", <http://www.comp.lancs.ac.uk/sociology/soc044rj.html> [accessed 23 October 2001]

JOHNSON M and REED H, 2008, *Entrepreneurship and innovation in the North*, Institute for Public Policy Research North, Newcastle, 38 pp.

LEINBACH T R and BRUNN S D (Eds.), 2001, *Worlds of E-Commerce*, Wiley, Chichester.

LOVERING J, 1999, "Theory led by policy: the inadequacies of the 'new regionalism' (illustrated by the case of Wales)", *International journal of Urban and Regional Research*, 23, 279-95

LUNDVALL B-A, 1992, *National Systems of Innovation: Towards a theory of innovation and interactive learning*, Pinter, London.

LUNDVALL B-A and MASKELL P, 2000, "Nation States and Economic Development", in CLARK G L, FELDMAN M and GERTLER M, *The Oxford Handbook of Economic Geography*, Oxford, Oxford University Press, 353-72.

MILES N and DANIELS R, 2007, *The State of the Innovation Economy in the UK – 2007*, O2C Arc, Milton Keynes,

MORGAN K, 1995, "The Learning Region: institutions, innovation and regional renewal", Papers in Planning Research No. 157, Department of City and Regional planning, Cardiff University.

MCCORD N, 1979, North East England, Batsford, London.

NONAKA I and TAKEUCHI H, 1995, The Knowledge-Creating Company, Oxford University Press, New York.

NORTH G, 1975, Teesside's Economic Heritage, Cleveland County Council, Middlesbrough.

NORTHERN WAY, 2005, Moving Forward: The Northern Way Business Plan, 2005-8, <http://www.thenorthernway.co.uk> [accessed 6 December 2005].

OECD, 2006, Territorial Review: Newcastle in the North East, OECD, Paris.

ONENORTHEAST, 1999, Regional Economic Strategy: Unlocking Our Potential, ONE, Newcastle on Tyne.

ONENORTHEAST, 2001, Strategy for Success, ONE, Newcastle on Tyne.

ONENORTHEAST, 2003, Regional Economic Strategy: Realising Our Potential, ONE, Newcastle on Tyne.

PIKE A, 2005, "Building a Geographical Political Economy of Closure: The Case of R&DCo in north East England", *Antipode*, 37, 93-115.

SIMMIE J, (Ed.), Innovation, Networks and Learning Regions, Jessica Kingsley, London.

SUM N-L and JESSOP B, 2008, Towards a Cultural Political Economy, Edward Elgar, Cheltenham.

THRIFT N, 2005, Knowing Capitalism, Sage, London.

TULLY, J, HUDSON R and TANNER B, 2006, Creating a Regional Knowledge Economy in North East England: Factors Affecting Knowledge Exchange, Final Report to the Cambridge MIT Institute and One North East.

WILKENSON E, 1939, The Town That Was Murdered, Left Book Club, London.