

2. Knowledge services

Ian Miles

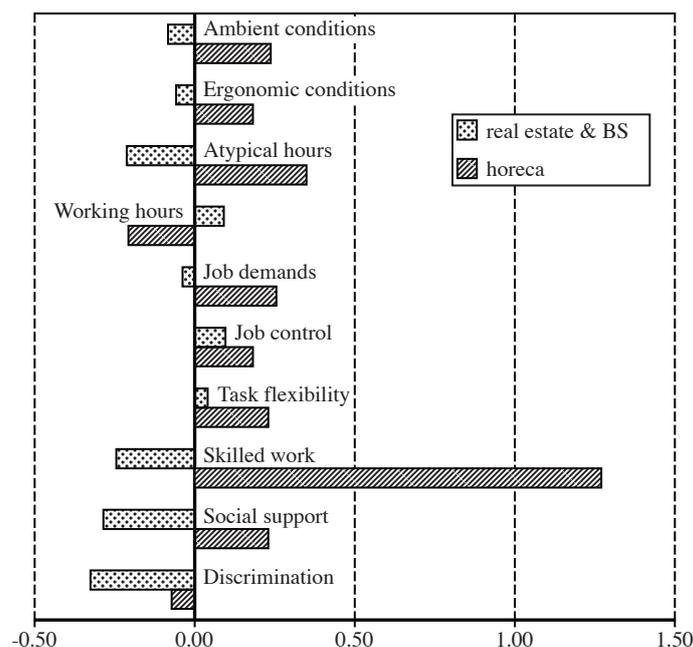
This chapter examines various efforts that have been made in recent years to understand the changing role of knowledge in services activities across industrial societies, and presents data on the ‘knowledge-intensive services’ sectors in Europe. It moves on to focus on the growing role of knowledge-intensive business services (KIBS), and explores the variety of activities that these undertake. Suggesting that KIBS have emerged as a parallel knowledge system to the public science base, a number of questions are raised concerning their social and economic implications.

INTRODUCTION

The growth of the services sectors is a phenomenon familiar to all advanced industrial economies. Not all service work is knowledge work, however, in terms of providing opportunities for learning and/or requiring significant skills. Indeed some service sectors and occupations are bywords for poor quality jobs. Notable here are sectors such as HORECA (hotels, restaurants and catering) – ‘fast food’ firms within this have now become famous for their ‘McJobs’, but the sector has long been a byword for low-grade employment. HORECA alone comprised some 4.2 per cent of the EU workforce (and 7.9 per cent of that in the USA) in 2000, 6.2 per cent of all employed in services (EC 2005). The data cited here refer to the EU-25, but most of the following discussion will focus on the (slightly more service-oriented) EU-15 countries. This provides a sizeable economic group, though we will be necessarily failing to take account of the considerable differences that exist between the member states of the EU.

Figure 2.1 provides a contrast between the HORECA sector and another service sector, real estate and business services, in terms of a range of working conditions. HORECA emerges as particularly poor compared to the economy as a whole in terms of a whole range of features of the job and working environment, while the real estate and business services sector comes out much more positively, with only ‘working hours’ and ‘job control’ looking poorer than the average of other sectors. HORECA only does well in terms of working hours and (absence of) discrimination, while most working conditions

are relatively poor ones, and in particular the jobs involved are seen as low skill ones (featuring, for example, monotonous work, little problem-solving, few opportunities to use judgement, and so on).



Notes:

Bars represent deviation of the sector from the average for all other sectors. Right-hand direction = more unfavourable conditions. Scales are based upon the following indicators, constructed from items in a large-scale EU-15 workforce survey:

- ambient conditions:** noise/vapour; danger/vibrations; high/low temperatures/ radiation
- ergonomic conditions:** painful posture/heavy work/repeated movements
- non standard hours:** working at night/in evening/more than 10 hours per day; work on Sundays/Saturdays
- working hours:** usual hours per week
- job demands:** work at high speed/deadlines
- job control:** free to choose order/method/ speed
- skilled work:** meet standards /judge quality/ solving problems/ monotonous or complicated tasks/new things
- task flexibility:** job rotation/ work in teams
- social support:** assistance/ regular talks with colleagues or boss
- discrimination:** confrontation with physical violence/harassment; discrimination from colleagues or clients

Source: derived from data presented in Houtman et al. (2002).

Figure 2.1 Working conditions in two European service sectors, 2000

We are familiar with the claim that the ‘developed’ countries have become service economies. Services sectors now dominate the European economy in terms of employment. (Since more services employment is part-time, if we considered the hours worked in the different sectors, the differences would be less marked, but still striking). A great deal of this employment is in public services, but just considering market services, the trend from 1970 to 1995 was from 31 per cent to 45 per cent of total employment, and the growth in EU-15 GDP was from 36 per cent to 50 per cent (Eurostat 1998). Non-market services accounted for another 14 per cent of GDP and 21 per cent of employment in 1995. These figures are slightly below those of the USA, slightly above those for Japan (OECD 1997).

The contrast between HORECA and real estate and business services demonstrates that we should be wary of discussing the services sector as if it were homogenous. Different service sectors display different characteristics and dynamics, which is not surprising, given the variety of economic functions they perform.

In terms of markets, some mainly provide services to their clients’ business processes – business services. Some mainly provide services to private consumers – personal and entertainment services, and also many financial, transport and hospitality services. Some, such as health and education are public services, organized by the state – whether as state agencies, or through the funding and regulation of private or voluntary organizations through state reimbursements.

In terms of functions, some services involve moving, maintaining, manipulating physical artefacts – freight transport, repair and maintenance, warehouses, and so on. Some have a major responsibility for supporting people’s wellbeing – their health, social welfare, personal appearance. Some process data and provide information – consultancy, telecommunications, computer services – even finance can be seen as processing information about property rights.

Even within such categories, requirements for knowledge and skills vary considerably. Within a category like business services, for instance, we find office cleaning and security alongside high-powered technical and professional support. Service employment contains highly professionalized work, large shares of white-collar, high-skill work; but also very basic and menial tasks in cleaning, sales, and the like.

The heterogeneity of services has led many commentators to seek to differentiate among services subsectors on grounds of their markets or functions. Recently, there have been several lines of work introducing the idea of ‘knowledge-intensity’ into the equation. Starbuck discussed the issues facing knowledge-intensive firms, though he did not engage in statistical analysis (Starbuck 1992); Miles and colleagues focused on knowledge-intensive

business services or KIBS (Miles et al. 1995); and more recently the OECD and EU have been working extensively with the category of knowledge-intensive services (for example, EC 2003; OECD 2000).

KNOWLEDGE-INTENSIVE SERVICES

This category is proving influential in economic commentary and policy analysis, where the growth of knowledge-intensive services is seen as indicative of the emergence of the knowledge-based or knowledge-driven economy. In part this category is intended to complement the high-tech (or high- and medium-tech) categories of manufacturing industry, whose significance for growth and competitiveness has been long accepted. But the manufacturing sectors that are commonly identified with these categories (aerospace, automotive engineering, pharmaceuticals, and so on) could be relatively readily determined in terms of such indicators as the share of R&D that they were investing, or the intensity of this investment. (Though there are strong lines of critique of the high-tech/low-tech classification – see for example the PILOT studies.¹) Service sectors tend to invest less in R&D than might be expected, for reasons that we consider later. Thus instead of the high-tech/low-tech demarcation, one based on high or low knowledge-intensity has been elaborated.

Table 2.1 displays the classifications of the various sectors of the economy, identified in terms of their NACE codes,² into the new categories. One result of this classification approach is that no less than half of the workers in services in the EU25 are classified as being employed in knowledge-intensive services sectors. (By way of comparison, around one in five people in the EU25, aged 25–64, currently has had a tertiary education; for KIS, the figure is just under a third of all workers having received a tertiary education (Götzfried 2004b).

Table 2.1 The OECD/EC classification of knowledge-intensive sectors

High-technology	Aerospace (35.3); Pharmaceuticals (24.4); Computers, office machinery (30); Electronics- communications (32); Scientific instruments (33)
Medium-high technology	Electrical machinery (31); Motor vehicles (34); Chemicals – excl. pharmaceuticals (24 excl. 24.4); Other transport equipment (35.2+35.4+35.5); Non- electrical machinery (29)

Medium-low- technology	Coke, refined petroleum products and nuclear fuel (23); Rubber and plastic products (25); Non metallic mineral products (26); Shipbuilding (35.1); Basic metals (27); fabricated metal products (28)
Low-technology	Other manufacturing and recycling (36+37); Wood, pulp, paper products, printing and publishing (20+21+22); Food, beverages and tobacco (15+16); Textile and clothing (17+18+19)
Knowledge-intensive high-tech services	Post and Telecommunications (64); Computer and related activities (72); Research and development (73)
Knowledge-intensive market services (excl. financial intermediation and high-tech services)	Water transport (61); Air transport (62); Real estate activities (70); Renting of machinery and equipment without operator, and of personal and household goods (71); Other business activities (74)
Knowledge-intensive financial services	Financial intermediation, except insurance and pension funding (65); Insurance and pension funding, except compulsory social security (66); Activities auxiliary to financial intermediation (67)
Other knowledge- intensive services	Education (80); Health and social work (85); Recreational, cultural and sporting activities (92)
Less-knowledge- intensive market services	50 Sale; maintenance and repair of motor vehicles and motorcycles/ retail sale of automotive fuel (50); Wholesale trade and commission trade, except of motor vehicles and motorcycles (51); Retail trade, except of motor vehicles and motorcycles/ repair of personal and household goods (52); Hotels and restaurants (55); Land transport/ transport via pipelines (60); Supporting and auxiliary transport activities/ activities of travel agencies (63)

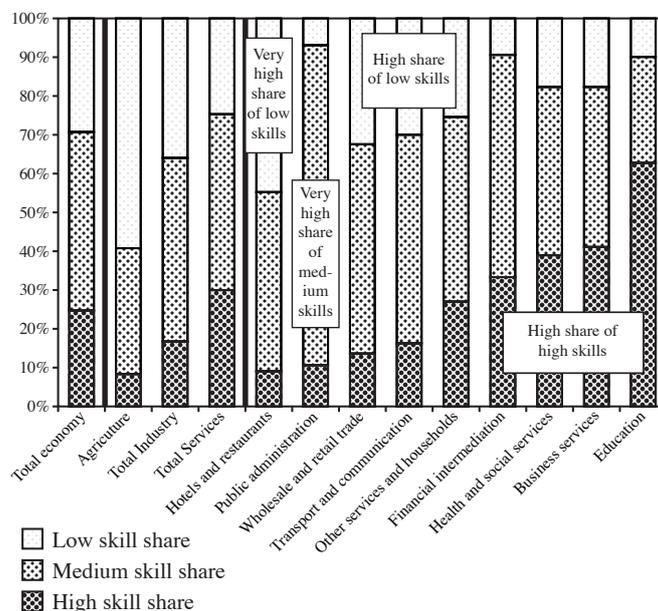
Other less-knowledge-intensive services	Public administration and defence/ compulsory social security (75); Sewage and refuse disposal; sanitation and similar activities (90); Activities of membership organizations n.e.c. (91); Other service activities (93); Private households with employed persons (95); Extra-territorial organizations and bodies (99)
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Source: compiled from Götzfried (2004a, b), Strack (2004).

Figure 2.2 goes on to present data on the extent to which the labour force of major services subsectors is composed of people with high, medium or low skills. Classification is based on educational attainments in this case. As usual we may express reservations about a classification that allocates as low-skilled such a high proportion of agricultural workers – who surely have considerable knowledge, acquired on the job if not through formal training, of the complex circumstances and requirements of crops, livestock, terrains, weather, and so on. The classification is presumably best at capturing certain forms of, mainly credentialized, knowledge. That being said, the Houtman et al. (2002) analysis of the Working Conditions survey reported agriculture as among the sectors with most unskilled work, perhaps reflecting the large-scale use of low-skill, casual or seasonal, labour in monotonous jobs like harvesting fruits, and so on.

Several highly interesting things emerge from Figure 2.2. Four subsectors of services appear to have particularly high requirements for high-skilled workers – two mainly public services (education and health) and two private services – business services, strongly, and also financial services. Public administration is notable for its large share of medium skill (mainly office) jobs.

Health and financial services are both activities where highly skilled professionals are applying their knowledge to effect transformations. In the former case, knowledge of biochemistry, physiology, pharmaceuticals, surgery, and so on, is used to influence bodily well-being. Information is provided to patients and communities, as well as other professionals, about appropriate behaviour required to support wellbeing. Financial services are largely about processing information about ownership rights and values of money and monetized commodities. Information is provided to customers and investors about changes in these conditions – in the case of some investments in amazing depth and/or rapidity. Both health and financial services may create generic knowledge as well as highly localized knowledge of the circumstances of specific clients. In most countries, health services notably feature large-scale R&D activities alongside more routine (testing-oriented) laboratory work.



Notes: low skill is defined in terms of attainment of less than upper secondary education (below level 3 in the International Standard Classification of Education (ISCED) classification); medium skill involves attainment of upper secondary education (ISCED level 3). High skill is an attainment of higher education (ISCED levels 5, 6, and 7).

Source: developed from data and skill classifications presented in annexes to EC (2005).

Figure 2.2 Skill composition of economic sectors in the EU-15, 2000

Business services share some features of these two subcategories, in that some business services involve applying specialized knowledge to effect transformations – writing and deploying software, for example, or designing new buildings – and some involve providing clients with information – advice from management consultants or marketing specialists, for example. But some business services are also engaged in creating generic knowledge as a major activity – most obviously in activities like market research and R&D services, but in the case of many other business services too. We shall return to this shortly.

Education is largely comprised of the dissemination of knowledge through pedagogy, in which information is provided in learning contexts that are intended to enable the teacher and student to build (and ascertain that they are building) a shared knowledge base. Generic knowledge is produced, too, especially via

the extensive research activities of tertiary education. These activities (together with those of government laboratories) form the 'public science base', and have traditionally been seen as the main source of generic knowledge. The now unfashionable 'linear model' of innovation portrayed a process whereby scientific discoveries and understanding of how the world works are made in the public science base, and the new knowledge is eventually commercially exploited by the private sector as it is embodied in innovations.

This model has been much criticized, not least because it overlooks the multiple linkages and feedback loops between public research (whether 'curiosity-driven' or more applied) and the practical problems encountered by innovators and by organizations in public and private sectors. Alongside the recognition that the linear model describes just one of the processes that underpin innovation (though possibly a more important process than its current unfashionability might suggest) (cf. Fagerberg et al. 2004), there are more radical suggestions that fundamental shifts are underway in the production of knowledge in our societies.

The 'new production of knowledge' thesis (Gibbons et al. 1994) asserts that we are moving from a world where generic knowledge was typically produced by the public science base tackling problems that were more or less discipline-determined, to one where the norm is much more for such knowledge to be generated by a variety of actors confronting problems that are more rooted in practical dilemmas. A major plank of this thesis is the rise of the industrial R&D laboratory, and the realization that, in sectors like pharmaceuticals, computer sciences, and now biosciences and nanotechnology, such laboratories may be undertaking research that is just as fundamental as that pursued in universities. The emergence of the concept of 'strategic research' as opposed to the traditional dichotomy of 'pure' and 'applied research' is another element in this.

The parallel growth of the service economy suggests that yet another aspect of the new production of knowledge is the rise of private knowledge-oriented services. In particular, the phenomenon of knowledge-intensive business services (KIBS) is of considerable significance, as a kind of private service analogue to the public science base. Let us examine these services in more detail.

BUSINESS SERVICES

The most rapidly growing services subsectors in Europe have been business services (BS). It is best to think of the label as referring to the activities they undertake, rather than the clients they serve, since much activity of some BS is undertaken for public sector clients rather than for 'businesses' in the form of private sector firms. BS contribute to the business processes of other

organizations – public (and voluntary) bodies as well as private sector firms. They are located statistically within NACE section K (real estate, renting and business activities).

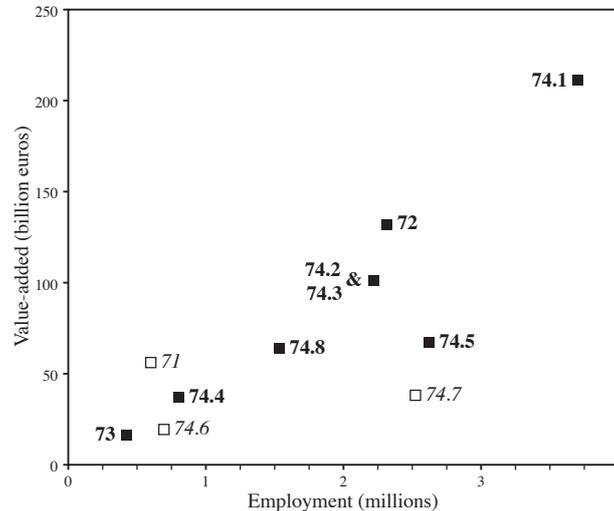
The BS sub sectors are:

- NACE 71 (Renting of machinery and equipment without operator);
- NACE 72 (Computer and related activities);
- NACE 73 (R&D); and
- NACE 74 (Other business activities – Legal activities; Accounting and tax consultancy; Management consulting; Market research; Advertising; Architectural activities; Engineering activities; Technical testing and analysis; Labour recruitment and provision of personnel; Security activities; Industrial cleaning; Secretarial and translation activities; Packing activities).

Excluding NACE 71, these activities range from highly professional services, to ones that involve more basic secretarial and clerical tasks (basic symbol-processing), and more physical and manual activities (for example, industrial cleaning). Among the professional services we can distinguish between those focused on technological knowledge, and those drawing more on knowledge of administrative and other institutional systems.³ These are the two basic types of KIBS, and they are among the fastest growing and most dynamic sectors of the economy (Miles 2005). They play particularly important roles in that not only can they improve the efficiency of business processes, but they can also transfer knowledge to their clients and/or participate in the generation of new knowledge.

The KIBS contribute some 16.4 per cent of business employment in the EU-25, 27.6 per cent of employment in market services. Figure 2.3 illustrates the relative size of different KIBS (and related business services) in the EU-25, plotting employment against value-added. ‘Legal, accountancy and management services’ is easily the single largest category (3.7 million employees), followed by ‘Personnel services’ (2.6m), ‘Computer services’ (2.3m), ‘Architecture, engineering and technical services’ (2.2m); ‘Advertising’ (752k) and ‘R&D services’ (366k).

The UK emerges as the largest employer in absolute terms in almost all classes of BS, followed by Germany and France, while in terms of the share of the activity in the domestic economy, Luxembourg and the Netherlands are notably higher than the EU average. The new Member States’ KIBS typically have smaller shares of employment than in the EU-15.

*Notes:*

Key to NACE codes:

71= Renting & leasing; 72 = Computer services; 73 = R&D services; 74.1 = Legal, Accountancy and Management Services; 74.2 & 74.3 = Architecture, Engineering and Technical Services; 74.4 = Advertising and Market Research; 74.5 = Personnel Services; 74.6 = Security Services; 74.7 = Industrial Cleaning; 74.8 = Misc. Business Services. The italicized sectors (light bullets in figure) are mainly business services that are less knowledge-intensive than the KIBS.

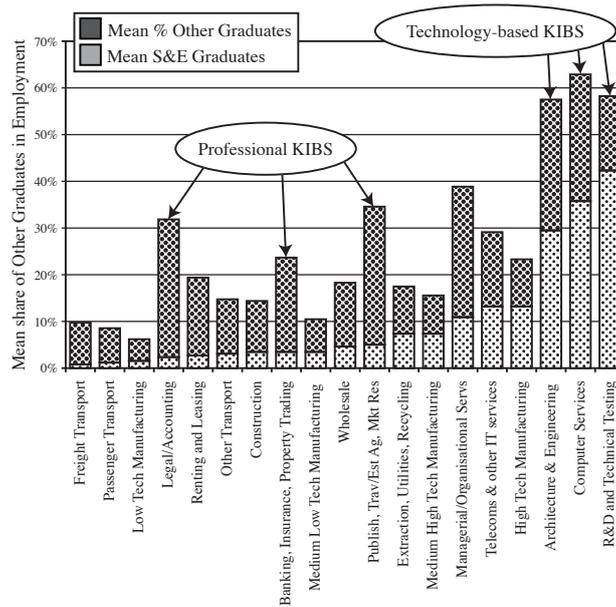
Source: based on data from Eurostat (2004, chapters 22 and 23).

Figure 2.3 Employment and value-added in business services, EU-25, 2001

Over the last decade, these sectors have almost all, and in almost all countries, shown rates of growth that are higher than those of the economy as a whole, and than those of other market services. Their structural composition is, like that of most services, more a matter of small firms than is the case for manufacturing. (Among the KIBS, R&D services are more oriented to large firms.) Often the subsectors feature a few large transnational companies, alongside a large number of small firms. The former often service transnational clients. The latter often service clients in specific localities (reflecting the geographical ‘stickiness’ of knowledge and/or the importance of trust and personal contacts in service supplier–client relations). Some small KIBS service wider markets, providing in such cases usually highly specialized knowledge (for instance, one UK firm supplying computer security software and services has just two employees, and clients in several dozen countries round the world). Like many other services, too, KIBS subsectors often have higher shares of women in the

workforce than the economy as a whole. Finally KIBS also feature high foreign presence. One EU study found that over 20 per cent of employment in legal and accounting activities, tax consultancy, market research and management consultancy was constituted by foreign enterprises in the (limited set of) Member States surveyed. High foreign presence is also displayed in computer and R&D services. (Cf. Miles 2005, for further discussion of the data in this paragraph.)

The knowledge-intensity of KIBS, and the different sorts of knowledge they draw upon, can be shown from workforce statistics, in this case derived from the Community Innovation Survey's (CIS) questioning of managers as to the sorts of graduates that they employ, and their share in the employment of the establishments in question. The CIS does not cover all services subsectors, it differentiates simply between Science and Engineering graduates (S&E) and Other graduates (OG); and at present we can only outline UK data – in Figure 2.4. But the results here are again very striking.



Notes:
 Chart ordered in terms of share of S&E graduates.
 Mean share of graduates in firms' total employment (unweighted)

Source: data and calculations from Tether and Swann (2003).

Figure 2.4 Employment of graduates in major UK sectors, 2000

It is KIBS sectors that are outstandingly knowledge-intensive in terms of the shares of graduate employees in the workforce. In contrast, transport, wholesale and even telecommunications services have fairly low proportions of graduate staff (they are more like manufacturing in employing relatively many operatives qualified to lower levels). Services not covered in this survey will often be similar – HORECA, retail and personal services, for example; though many public services will have high shares of graduate employment.

The data also differentiate reasonably clearly between the more professional (and traditional) KIBS, and those that are more technology-oriented ones. The technology-oriented KIBS are at the right-hand side of the chart because they employ both types of graduate intensively – computer services, architecture and engineering, and (mostly focused on S&E graduates) R&D and testing services. More professional KIBS sectors are represented by the peaks in the chart that correspond to high shares of OGs – legal and accountancy services (helping clients with knowledge about administrative and regulatory practices), informational services like publishing and market research, and (also with numerous S&E graduates) management consultancy. Telecommunications and financial services are less graduate-intensive than these KIBS, but still have higher shares of graduates than even high-tech manufacturing.

What is it that KIBS are doing? One approach is to see them as problem-solvers for their clients, applying and, more or less often, generating generic knowledge to solve the specific problems that have been encountered. They deploy their generic knowledge, fusing it with information they obtain from their clients to diagnose the nature of problems, to provide relevant intelligence and advice, to prescribe and even to implement solutions.⁴ Sometimes the client is highly involved in the process of problem-solving, sometimes the activity is more at arm's length.⁵ Problem-solving may involve innovation – the production of new solutions and new knowledge – and the client may be a co-producer of the innovation in such cases.

Some traditional professional services deal with problems associated with social systems and institutions, especially administrative rules and regulations (for example, legal and accountancy services). Less formally governed problems concerning social groups and interests are at the heart of marketing and issues consultancy services, for example. Other services support interorganizational activities such as supply chain management. Some KIBS have more of a focus on psychological and biological problems, as with medical and veterinary services, educational and clinical psychology and psychiatry, counselling, and so on. Others are more concerned with the physical world. For example, engineering services are concerned with construction systems or transport infrastructure; laboratory testing and research services with the properties of materials, chemicals and devices; and IT services of various kinds with symbol-processing or with the configuration and integration of discrete items

of hardware and software. The technology-oriented KIBS assist in diffusing new techniques and systems to their clients throughout the economy, and are thus significant actors in innovation processes. R&D services are of course intimately involved with innovation, as they undertake knowledge-creation for their clients.

Some KIBS are hybrids of technology-oriented and more traditional professional services. For instance, even though fields such as architectural and design services feature many firms who mainly undertake quite routine work, they also feature others who combine different forms of creativity – design and aesthetics, innovative use of technologies – and have to negotiate social and administrative systems. Additionally, traditional professional service subsectors often feature some firms who have developed strong competencies in specific technologies and techniques and who may apply this in the form of consultancy as to their clients' technology strategies. For instance, many accounting and management firms have developed capabilities in IT consulting for clients; some lawyers specialize in IT or patent law, some financial advisors and market analysts become expert in high-tech or consumer innovation fields, and so on.

Who are KIBS' clients, then? This is a question that can be examined through the analysis of input–output tables, but which has attracted surprisingly little attention to date. In one examination of the issue, Peneder (2000) considered the growing use of what he termed 'knowledge-based services'. (These comprise financial services, business services, and communications – thus the category includes KIBS, but is more extensive of the definition of KIBS we have used above, while being more restricted than the EC/OECD 'knowledge-intensive services' category.)

The numbers extracted from input–output tables confirm again the rise of knowledge-based services, by depicting their growing role in intermediate inputs to production across the economy. In France, the share of knowledge-based services in the intermediary inputs of the total economy grew from 17 per cent in 1970 to 34 per cent in 1990 – the highest among the countries Peneder compared. Corresponding figures, ordered in terms of this final figure, were: the Netherlands 9 per cent (1972) to 33 per cent (1997); United Kingdom 5 per cent (1968) to 30 per cent (1997); USA 19 per cent (1972) to 31 per cent (1996); Denmark 11 per cent (1972) to 29 per cent (1995); Germany 16 per cent (1978) to 26 per cent (1990); and finally Japan 8 per cent (1970) to 17 per cent (1990).

While there is considerable variation across countries and over time, some common features emerge from the data. Service sectors are the major users – especially knowledge-based services themselves. In all countries c.1990, the distributive sector has a high share of knowledge-based services in its intermediate inputs; in France and the Netherlands alone manufacturing

emerges as an intensive user by this metric (and even then is still a less intensive user than are service sectors); and Denmark (in 1995) is outstanding in the reliance of personal and social services on these inputs.

Such phenomena require more detailed examination. There are likely to be substantial variations across different types of KIBS as well as across countries and time. For example we have recently examined input–output data on users of R&D services for a number of EU countries, and find that the lead users vary considerably across countries (reflecting in part their industrial structure), though public sector users (health, defence, and so on) are frequently prominent. How far KIBS will grow is a matter of businesses acquiring knowledge or knowledge-based solutions from external specialists, and how far it involves changes in the public sector (that is, to a large extent, in other ‘knowledge services’) is a topic of considerable interest.

CONCLUSION

The growth of ‘knowledge services’ is in many ways a recognized feature of the emergence of the ‘knowledge-based economy’ and the ‘services economy’ as it reflects the intersection of these reconfigurations of the economy. It is a development that is unsurprising given the ongoing intensification of the division of labour and the requirements for specialized knowledge to deal with ever more complex organizational environments, and ever more powerful technological innovation. The growing role of KIBS within these developments is also now reasonably well accepted, though the role played by KIBS remains relatively poorly documented and understood.

The emerging literature on services and innovation stresses the important role that services can play as innovators, and in the case of KIBS, as innovators for their clients, not just as innovators in terms of their own service processes and products. Though much remains to be understood about the organization and functioning of these innovation processes, they are attracting attention from several sources.

What remains less a focus of attention, however, is the significance of the rise of these new centres of knowledge production for the economy and society more generally. The traditional production of knowledge through the public science base may be far from perfect, but it is something that has evolved over a lengthy historical period. There has been a steady consolidation of rules of practice with respect to the balance between, for example, quality control versus the desire for rapid dissemination of results, intellectual property rights versus the provision of public goods, academic freedom versus social responsibility, and so on. These rules may often prove problematic – for example, in some countries they inhibit collaboration between universities and industry to a

considerable extent. But they are reasonably well understood, and there are forums in which their future development can be discussed.

The new knowledge bases associated with KIBS are much less well understood. Some KIBS have long been represented by professional associations and other bodies that provide a measure of self-regulation. (Even in such cases there are some grounds for concern – the Enron scandal, for instance, raised questions about the oversight exercised in the accountancy profession.) Other KIBS are much newer professions, and in some cases relatively few of the experts involved actually belong to professional bodies. Questions arise as to quality control, the private ownership of knowledge, intellectual freedom (including whistleblowing) and the career prospects for knowledge workers. None of this is to argue against the rise of KIBS – indeed, they contribute flexible and rapid access to knowledge that serves important social and economic functions, and that can be hard to access via labour mobility or interaction with universities. But in order to understand and support this process, and to ensure that social interests are served by the new constellation of knowledge services, such questions need to be addressed.

NOTES

1. The website of the PILOT project is at: <http://www.pilot-project.org/>. An example of the products of this project is Laestadius (2006).
2. NACE is an acronym for *nomenclature statistique des activités économiques dans la Communauté Européenne* (that is, 'statistical classification of economic activities in the European Community'). This is a 'sectoral' classification, replacing the earlier SIC (Standard Industrial Classification) codes.
3. Among the BS that should probably be excluded from a strict definition of KIBS, apart from NACE 71, are at least parts of NACE 74.6 (Investigation and security activities); 74.7 (Industrial cleaning); 74.82 (Packaging activities); and 74.83 (Secretarial and translation activities).
4. Specific firms seem to be relatively specialized in these different functions. See Kastrinos and Miles (1998); Miles (1998).
5. See Nahlinder (2005), who surveyed a large sample of Swedish KIBS as to their client relationships.

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