Services and Innovation: Dynamics of Service Innovation in the European Union

FINAL REPORT

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EXECUTIVE SUMMARY

Established industrial and innovation policies are often poorly adapted to the requirements of innovators in the service sector (a field that is growing in importance as a focus of innovative effort). To meet the needs of firms in the services industries more adequately, policy must address a number of key areas:

1. **Barriers to trade in services** - higher levels of trade will often increase competition and therefore innovation. In addition, a low cost entry route to international sales can often be associated with higher capital expenditures. However, the *intangibility* (and associated problems of storability and transportability) of many services can imply that exporting is difficult for some companies in this sector. Such companies are forced to rely upon other forms of overseas expansion, such as obtaining an immediate physical presence through FDI, the movement of personnel, the establishment of partnerships, or the negotiation of franchising arrangements. These strategies are often more expensive than exporting and are hampered by a range of factors (for example, differing professional standards and regulations).

2. **Accounting for growth** – the core 'value' of many service firms relates to their stock of *intangible assets* (i.e., human resources, brands and trademarks, and non-IPR protected 'know-how'). However, as measuring and accounting for intangibles is notoriously problematical, many services firms find it difficult to raise capital to (a) launch innovative products, programmes and enterprise, and (b) grow their companies. Additionally, since it is hard to measure the impact of many service innovations, it can be difficult to justify innovation-oriented expenditures within companies.

3. **Intellectual Property Rights (IPRs)** - IPRs are rapidly gaining importance in the more research and technology intensive service sectors (although patent protection has little relevance for most service activities). In addition, the majority of small and inexperienced service companies consider IPR protection to be expensive and of uncertain benefit. Policy could consider ways to support and assist innovating services in gaining access to appropriate IP protection.

4. **Support for Innovation** – the opportunities for national and supra-national governments to support innovation in services are manifold. Policy could:

- facilitate the establishment of services innovation centres (existing innovation centres are predominantly oriented to manufacturing and related industries);
- help promote innovation support policies to services (even innovative services demonstrate low awareness and take-up of support programmes);
- support the types of technical infrastructure and human resource development required for innovative services (each of which have their own particular features); and
- promote awareness within the services industries of the need for sound innovation management strategies and techniques. This could be achieved via the use 'best practice' exemplars and the launch of benchmarking schemes. (As latecomers to innovation, many services display poorly developed innovation management capabilities and poor linkage into formal innovation systems).

  Additionally, despite growth in R&D activity, much service innovation has a strong "disembodied" or organisational component. Efforts are required to enable measurement of and policy support for such activities (in addition to more "tangible" innovation-related expenditures).

Why and How are Services Different from Manufacturing?

1. Services differ from manufacturing industries principally because:

- Their outputs are often **"intangible"** - services cover a wider range of activities than manufacturing, working not only with artefacts, but with people, symbolic information and environments. They more often produce *transformations* (e.g., in people, things or data) than they produce *things* (i.e., physical artefacts).

- They are highly **interactive** - services often involve clients very closely in the delivery and even the production of the service. Intangible services are often consumed at the moment and point of delivery (and even of production).

2. Together, intangibility and interactivity have meant that, until the advent of new information technology, many services **have not been technology-intensive**. Unless they were

public services, they also tended to be organised on a small scale (exceptions include large scale 'network' industries such as broadcasting and telecommunications, and financial services, which have generally been at the vanguard of adoption of ICT, and whose technological innovation problems are often shared with firms in other sectors). More recently, business services that support technology adoption and use have also become technology-intensive.

3. Most services **innovate more slowly** than their manufacturing counterparts (even when size differences are taken into account). They invest less in R&D, and probably undertake less radical innovations. Many small service enterprises have little interest in innovation, though they may face increased competition from large firms and new entrants.

4. Since many services have been late in the adoption of technology, they tend not to be so well **linked into innovation networks and systems** (the formal and informal structures of which tend to be directed predominantly towards the needs of manufacturing industry). Furthermore, they have less often been the assumed targets of innovation policies. By default, services tend to be overlooked in activities aimed at promoting innovation.

5. The **major barriers to innovation** noted by innovating services firms concern **organisational rigidities** and **access to finance and human resources** The most important sources of information for innovation lie within the firms themselves.

6. The standard instruments for **protecting intellectual property** are hard to apply to service product innovations because of their intangibility (patents are rarely appropriate).

7. **Human capital** plays a far greater role in generating innovations within service firms and in diffusing innovations in the market.

Contents

1. OVERVIEW

1.1 Introduction

1. This introductory section will establish the foundations for what is to follow by providing an overview of the nature of the services sector and by examining the importance and ubiquity of services in all advanced economies. The section will commence by exploring some efforts to characterise and define the services sector (along with services functions, industries and occupations) and will move on to establish the centrality of services in contemporary economic activity. To conclude, the section will consider the (sometimes vexed) question of productivity and performance across the range of services industries.

2. Having established the context for the discussion that will follow, subsequent sections of the report will consider (a) the specificities and distinctive nature of services-based activity and innovation, (b) the peculiarities of barriers to innovation in the sector, and (c) indications for the formulation of policy to assist in overcoming obstacles to innovation in services.

1.2 Understanding Services and Innovation

3. It is important to note that the term "services" is somewhat ambiguous: the descriptor has been applied variously to firms, to industries, to commodities, and to activities. The basic distinctions that are sketched below should not just lead to greater clarity: they also suggest important issues relating to 'boundaries' within and between organisations, industries and occupations.

4. Service *functions*, such as design, R&D, delivery, after-sales, marketing and maintenance are performed throughout the economy. When specialised workers perform these functions, they are engaged in service *occupations*. These jobs relate not only to 'white-collar', but also to other 'non-production' jobs such as security, catering and cleaning[1] and these are found in all sectors. The share of 'white-collar' employment (and particularly of high-skilled white collar employment) has been growing in practically all sectors and countries, suggesting an absolute growth of service functions carried out on an in-house basis.[2]

5. But these service functions may be performed by specialised service *firms*, in which case they will be attributed to service *firms* in service *sectors.* The service sectors have been growing,

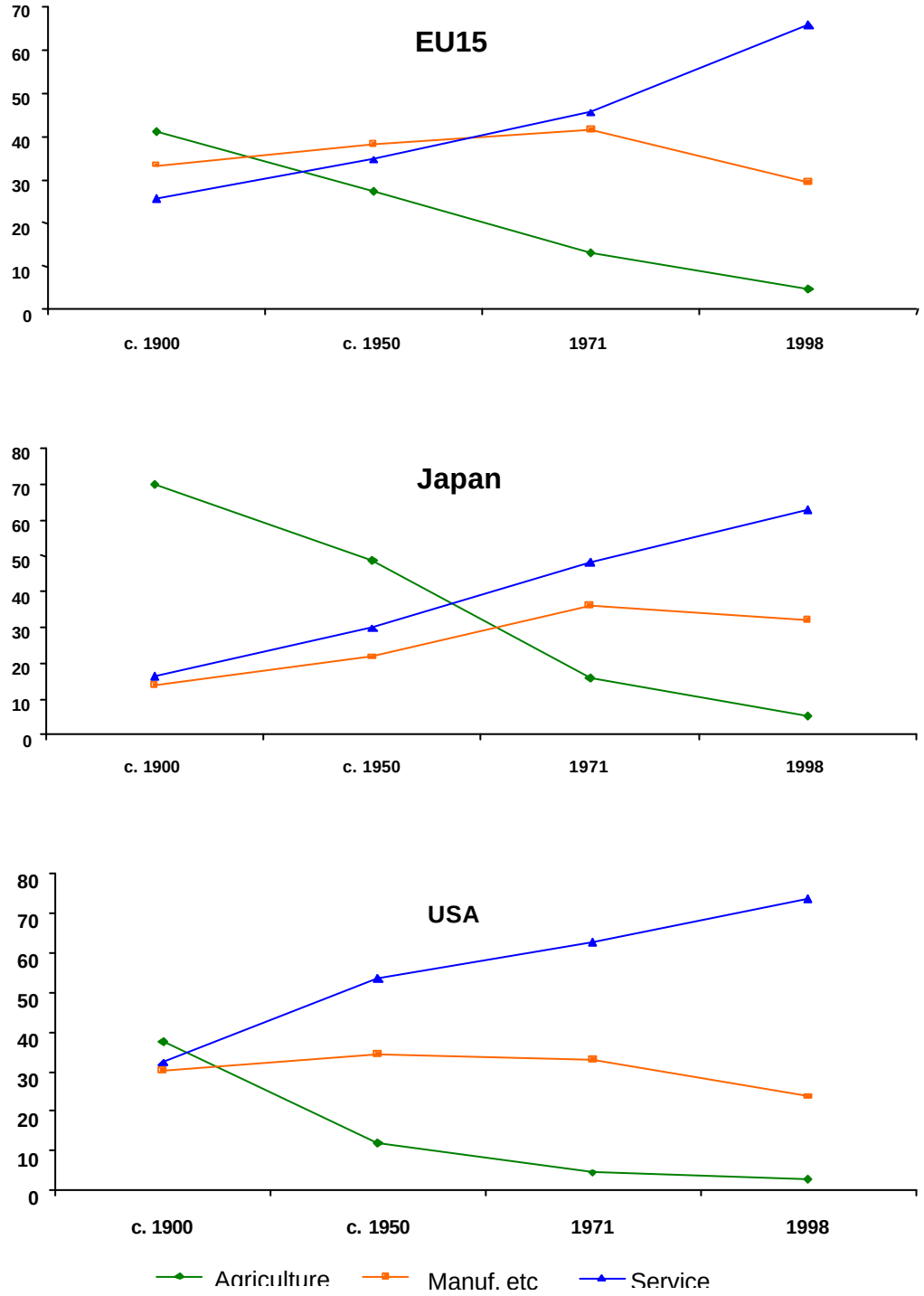
overall, in industrial countries much more rapidly than has been the norm for manufacturing sectors. Thus, between 1985 and 1997, around two thirds of GDP growth in the OECD business sector resulted from growth in the services sector[3]. Figure 1.1 presents data on the growth in services employment in the European Union, the U.S. and Japan. This growth alone justifies paying more attention to services' role in innovation and macroeconomic performance.

6. Complementing the growth of service occupations as a share of employment within all sectors, and thus an apparent growth of in-house service functions, there is also an increase in externalised service functions purchased by firms across the economy. Business services (also known as producer services or intermediate services) have been among the fastest growing parts of the services sector.

7. Service firms' output takes the form of "*services"*: that is, service *products* or service *commodities.* But such products can also be generated and sold (or delivered free of additional charge) by firms in any sector, manufacturing included. Many companies listed as computer manufacturing firms actually gain the bulk of their profits from the sale of computer *services*, for example. Companies in all sectors may perform service functions internally for their own use, rather than contracting them out to specialised service firms. The trends are striking: **both** the white-collar share of industrial workforces, and the service share of manufacturing firms' outputs are generally growing, **together with** the growth of specialised service firms. The rise of the "service economy" then, does not merely rest on the expansion of service sectors: it is a reflection of *services* having become more prominent right across the economy. Indeed, in large measure, the term 'service economy' reflects the fact that ever greater efforts are being made to ensure that products fulfil the requirements of clients and consumers (i.e., provide them with the required service functions).

8. These multiple meanings of "services" can be a cause of confusion and misunderstanding. However, they also point to important structures and processes. One issue is the trade-off between in-house and outsourced business services. Some of the growth of business service sectors reflects an outsourcing of functions that were previously performed within manufacturing firms (or other services[4]), though this cannot be the whole story.[5] Even more significant is the issue of convergence or 'boundary blurring'. With service functions and occupations evident across the economy, it is likely that the problems and opportunities that currently confront service firms, will be increasingly apparent in the service components of firms in manufacturing and other sectors. Thus, new features of innovation visible in service sectors, may well be experienced more widely in service activities and functions.

Figure 1.1 Percentage Shares of the Three Grand Sectors in Total Civil Employment (EU, US and Japan)



Source: Feinstein (1999)

9. Lastly, what do we mean by **innovation**? The term is used here to indicate that firms are 'doing something new', i.e., introducing a new practice or process, creating a new product (good or service), or adopting a new pattern of intra- or inter-organisational relationships (including the delivery of goods and services). Innovation is not merely synonymous with 'change'. Ongoing change is a common feature within most business organisations. But this may only be described as innovation where particular qualities are displayed. For example, the recruitment of new workers constitutes 'change' but is an *innovative* step only where such workers are introduced in order to import new knowledge or to carry out novel tasks. Similarly, expansion into new markets represents change in organisational tactics – it is seen as *innovation* only where such activity involves the introduction of new products or processes.

10. Innovation as understood here can be either technological or organisational in nature. Although most of the research cited below focuses on the former, organisational innovation is evident (and important) in the operation and activities of both manufacturing and services firms across Europe and beyond. Innovation may also be unsuccessful – many products fail in the marketplace, usually because they do not meet user requirements (or fail to meet them as well as competitor offerings). Innovation will be the result of explicit innovative efforts – of which the most obvious is R&D (Research and Development). However, innovative effort extends well beyond this and includes, for instance, the acquisition of new generations of equipment and software, the training of staff, and the preparation of clients and markets for the introduction of new products.

1.3 Service Sectors and Service Firms

11. The service(s) sector and industries can be identified from the ISIC or NACE classifications that are commonly used to categorise business and non-commercial productive activities both within and between the three 'grand' sectors noted above. These categorisations or schema – whilst differing in detail – essentially attempt to achieve the same end, namely to allocate the full range of industrial activities to a progressively disaggregated set of classes. Thus, such activities are split first by sector, i.e., 'extractive/agricultural', 'manufacturing and related' and 'services', and then by core business or nature of operations. (For example, the services sector is subdivided into its constituent units: 'wholesale and retail trade'; 'hotels and restaurants'; 'transport, storage and communications'; 'financial intermediation'; 'real estate, renting and business activities'; 'public administration and defence'; 'education'; 'health and social work'; and 'other community, social and personal services activities'). Industrial classifications such as NACE and ISIC represent a serious attempt to acknowledge and

account for the services industries, a sector that has traditionally been of little interest to economists. Indeed, it should be noted that until relatively recently, the “tertiary sector” was effectively defined as a ‘residuum category’ into which were disposed all of the awkward parts of the economy that were not directly involved in extracting, manufacturing or constructing material products. Effectively, services were commonly defined in *negative* terms, i.e., as *not* making, growing, or mining things.

12. The detailed statistical classifications presented in the NACE and ISIC classifications offer more *positive* definitions. However, it can be argued that these schema are flawed insofar as specific groupings frequently include a highly diverse range of activities (for example, ‘hairdressing’, the ‘activities of news agencies’, and ‘sewage disposal’ are grouped together in NACE Sectors 90-93, i.e., ‘Other community, Social & Personal Services’). Efforts to segment economic activities in the services sector in more meaningful ways have thus proliferated. One influential approach has fixed upon ‘markets served’ as a means of categorising services providers and in this approach, a distinction is drawn between both:

    (a) *"Intermediate"* and *"Final Demand"* – wherein "intermediate" output is that sold to other firms or agencies and ‘final’ output is that consumed by end-users; and

    (b) *"Market"* and *"Non-Market Services"* - wherein ‘market’ services are those purchased directly by the customer (a firm or a private household) and ‘non-market services’ are those funded indirectly via taxation (note here though, that demarcations have become quite blurred as privatisation has proceeded).

    Deriving from this is a tripartite distinction in which *"Producer"*, *"Consumer"*, and *"Government"* services form the three opposing vertices of a services-provision triangle. However, this picture is complicated further as several researchers have sought to differentiate *distributive* services from those sectors that supply other service functions.

13. A very different approach relates economic sectors to their specific types of transformative tasks. The *primary sector* is concerned mainly with extracting raw materials from the environment. The *secondary sector* with transforming these raw materials into material goods and other artefacts. The *tertiary sector(s)* is also concerned with transformation, but with transformations that can take several distinct forms. Generic activities like ‘movement and storage’, ‘maintenance and revitalisation’, and ‘elaboration and intensification’ are targeted variously at realising transformations in the state of:

    - *the environment* - as in waste management, pollution clean-up and park-keeping;

- *artefacts produced by other sectors* – for example, repair and maintenance, goods distribution, building services, wholesale and retail trade;
- *people* - as in health and education services, public transport, hospitality and consumer services such as hairdressing; and
- *symbols (data, information and knowledge)* – as in entertainment services; communication services such as broadcasting and telecommunications; and professional services and consultancies.

This framework is particularly useful for structuring an exploration of the different types of technological innovations pursued in different services.

14. Whilst this report focuses on service firms and sectors, the particular issues that confront them are often liable to affect service functions in manufacturing firms. Service functions can, in principle, be significant loci of organisational learning and innovation in all sectors. The wave of activity around e-commerce is a good case in point: transactional and other activities (for example, marketing and exchange of design information) are being reconfigured through the use of new Information and Communications Technologies (ICT). A range of services supporting such innovations has arisen, too.

1.4 Services, Productivity and Performance

15. Classical economists believed predominantly that services were unproductive. While this view is no longer widely held, there is a long standing perception that services productivity leaves something to be desired. As services involve more of the labour input of developed countries (approximately 70%) than they contribute to output (approximately 60%), there have often been assertions that services are relatively less productive than manufacturing.

16. Figure 1.2 presents some highly aggregated comparisons of trends in services output. In the countries and periods covered, output growth in the services sector frequently exceeded that of the whole economy. (In France, financial services contracted, leading to lower services output growth.) Figure 1.3 presents further comparisons of trends in services labour productivity. Four of the six countries (Japan and Germany were the exceptions) displayed more rapid services sector labour productivity growth towards the end of the 1990s.

17. While services employment has grown, manufacturing employment has typically shrunk: manufacturing tends to display higher labour productivity growth than services – contributing about half of non-farm business sector productivity growth from 1990-97 in Finland, France, Italy, Japan, the United States and (Western) Germany[6]. Table 1.2 from OECD data confirms

this general picture, though *some* market services emerge as strong contributors (communications very commonly, and over the more recent period, sectors such as retailing in the USA and transport in Italy).

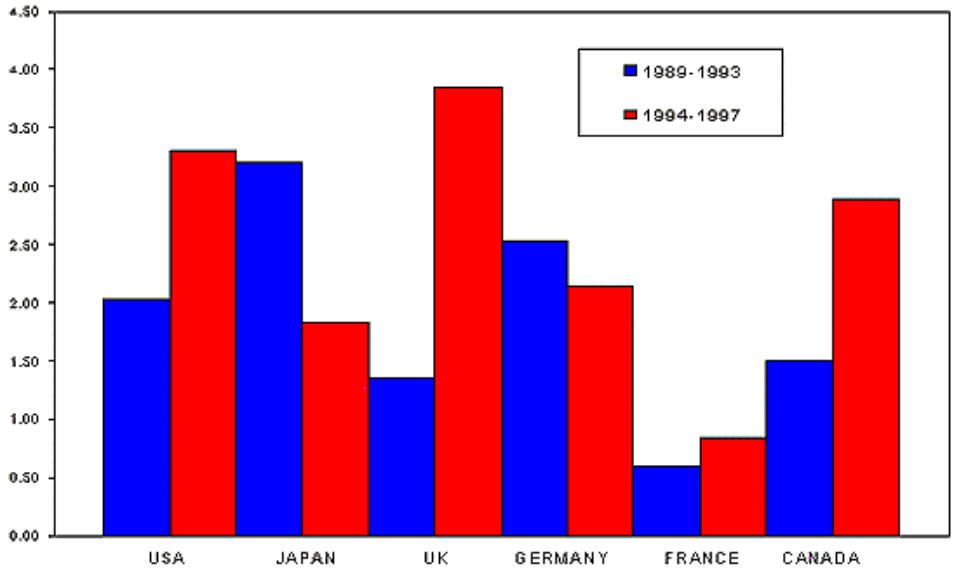
18. The question of services productivity and productivity growth is a contentious one. Productivity measurement in services is notoriously problematic and output indicators are often hard to interpret. In addition to underestimating quality improvements, such indicators often fail to capture impacts on (and the involvement of) service clients. In the US, efforts to build improved output measures for some services sectors (based upon examining indicators of quantifiable outputs) suggest that actual growth in output is significantly higher than that captured by official statistics. Even non-market and public services, where output measurement is particularly difficult, have been shown to display labour productivity growth in relation to measurable indicators of physical counts or quantities of services.[7]

19. Such work on improving output measurement for services has typically been concentrated in single countries (Brookings and NBER work in the USA is notable here). There has recently been a range of studies attempting to develop sophisticated comparisons between countries and the UK's NIESR has undertaken a number of such investigations. Many interesting results are being obtained, and quite major international differences are evident- though these studies usually involve only a very few countries. And as noted in an NIESR study of banking sector productivity in the US, UK and Germany:

> "little is known about the main drivers of international differences in service sector productivity performance (in contrast to the smaller but better-researched manufacturing industries)."[8]

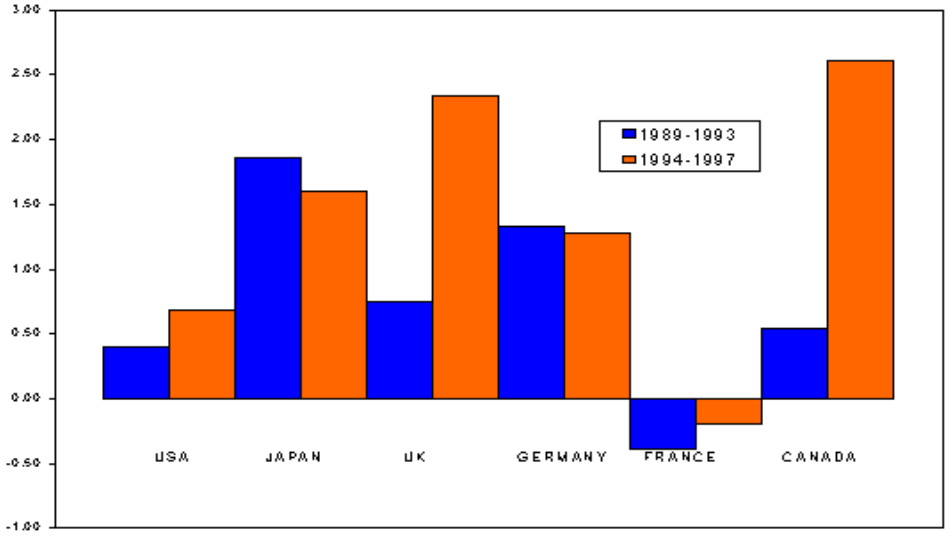
Thus investigations relating to service sector productivity remain highly exploratory, and provide few definitive general conclusions, not least because of profound inconsistency in the organisation of service work between different countries and industries. It does seem very likely though, that services productivity growth has been widely underestimated. The extent and significance of this underestimation remains an issue for debate, and this is clearly an area demanding more concerted research effort.

Figure 1.2 Service Sector Growth in Output, 1989-97



Notes: Growth estimates for Germany and France from 1992. US estimate until 1997. Remaining countries have growth estimates including 1998

Figure 1.3 Labour Productivity Growth in the Service Sector, 1989-1997



Notes: Growth estimates for Germany and France from 1992; US estimate until 1997; Canadian until 1996. Remaining countries have growth estimates including 1998.
Source for Figures 1.2 and 1.3: SITRENDS (taken from *Services Statistics in Value Added and Employment 2000*, OECD 2001, on-line at *http://www.sitrends.com/reports/statistic.asp)*

Table 1.2 Labour Productivity Growth in the Services Sector 1979-89 and 1990-97

		France	Italy	Nether-lands	Sweden	West Germany	Japan	United States
NACE	**Sector**	**1979-89**						
6000	**Wholesale & retail trade, restaurants and hotels**	**1.2**	**0.4**	**1.6**	**1.6**	**0.9**	**4.4**	**1.3**
6120	Wholesale & retail trade	1.6	0.5	3.0	2.4	1.2	-	1.4
6300	restaurants and hotels	-0.6	-0.4	2.2	-3.5	-0.9	-	-0.4
7000	**Transport, storage and communications**	**3.8**	**2.0**	**2.6**	**3.8**	**3.1**	**4.1**	**1.6**
7100	Transport and storage	1.7	1.3	3.5	3.2	2.0	-	0.2
7200	Communication services	7.4	4.6	3.7	5.2	4.9	-	3.9
8000	**Finance, insurance, real estate & business services**	**0.1**	**0.0**	**0.7**	**-1.4**	**1.6**	**2.3**	**-1.1**
8120	Finance and insurance	0.2	-	0.3	3.1	-	-	-0.4
8300	Real estate and business services	-0.3	-	0.4	-2.9	-	-	-1.8
Total non-farm business sector		2.2	1.8	3.0	1.7	1.5	3.6	1.2
NACE	**Sector**	**1990-97**						
6000	**Wholesale & retail trade etc.**	**0.3**	**1.4**	**0.3**	**3.2**	**0.4**	**1.0**	**3.1**
6120	Wholesale & retail trade	0.6	1.5	0.5	3.3	0.7	-	3.0
6300	restaurants and hotels	-1.0	0.8	-0.7	2.3	-3.2	-	4.3
7000	**Transport, storage and communications**	**2.7**	**4.8**	**2.5**	**2.1**	**3.9**	**0.5**	**2.0**
7100	Transport and storage	1.4	2.6	2.5	0.2	2.0	-	1.9
7200	Communication services	4.8	10.9	3.1	7.5	7.2	-	2.7
8000	**Finance, insurance, real estate, etc**	**0.1**	**2.5**	**-0.9**	**3.0**	**2.8**	**1.8**	**-0.4**
8120	Finance and insurance	-1.8	-	-0.4	4.2	-	-	1.3
8300	Real estate and business services	0.4	-	-1.3	2.5	-	-	-1.2
Total non-farm business sector		1.7	2.3	1.0	4.1	2.1	1.0	1.6

Notes: Percentage changes, 1979-89 and 1990-97; underlining has been used where service growth is greater than the average for the economy as a whole.
Source: OECD, calculations based on the Intersectoral Database (ISDB).

20. Given the statistical problems, the nature and causes of the (apparent) gap in productivity growth in services remain ambiguous. It is possible, however, to examine the closely related question of innovation in services. If there appears to be a shortfall in services innovation, the case is strengthened that there really are problems with productivity growth. Before turning to this in the Section 2, it is worth noting the vigorous debates concerning a putative "productivity paradox" as these bear strongly on the question of services productivity. The "productivity paradox" is founded on the proposition that rapidly rising ICT hardware and software expenditure since the 1970s has not been translated into enhanced productivity[9]. Arguments to emerge during the 'paradox' debate have centred on such questions as:

    - 'why does ICT investment not show up in improved productivity?' (*does it perhaps show up only in the long term, after organisations have learned to use ICT effectively?)*;
    - 'is the improvement in US productivity growth since the mid 1990s the result of *intensive* ICT investment?' *(and is this improvement one that is solidly based and sustainable?)*; and
    - 'will the EU follow this pattern too? *(and if so, will this happen automatically as ICT is assimilated across the economy, or does it require more deliberate changes?)*'

21. Services sectors, mainly driven by areas like financial services, are exceptionally ICT-intensive, accounting for even more of the volume of ICT investment than their share of economic activity more generally. In some cases services ICT use is believed to have benefited productivity. Dirk Pilat[10], reviewing OECD data on service productivity, concludes by noting that:

    > "distribution sector … productivity has been positively affected by the use of ICT (scanning, inventory management systems) and by closer integration of manufacturers and retailers. Productivity in transport and communication has risen rapidly over the past decades. In telecommunications, annual productivity growth rates of up to 8% were achieved in some countries. Some countries also performed well in transport, with annual productivity growth of close to 3%. In other services – notably community, social and personal services – productivity growth has been more sluggish. Although this may partly reflect measurement problems, many of these services are also less easily automated or less affected by technological improvements. Some services may have little scope for productivity growth. In certain cases, it may be difficult to reduce labour input."

22. It appears then that intensive investment in ICT has had an impact on productivity in some segments of the services sector. (Further gains may be realised as organisational learning leads to more effective ways of employing the technology.) Other service segments may in the

future also enjoy productivity benefits as a consequence of the introduction of ICT; for some, the benefits may take the form of service quality enhancements rather than improvements in labour productivity.

1.5 Summary

23. Debates relating to the importance and dynamics of services (and the nature of innovation in the sector) have become increasingly prominent over the past 30 years. During this period, the services sector has overtaken manufacturing in all developed economies (in terms of both share of employment and output). Services continue to grow rapidly in these countries and in less industrially developed territories alike[11]. The issues of productivity and innovativeness within the sector continue to provide foci of argument and contention. Later sections of the report will deal with the nature of services innovation and obstacles to it in more detail. The next section will examine the key characteristics of the services industries (i.e., those that distinguish services organisations from firms in the manufacturing sector), and consider how these characteristics interact with and shape the nature of innovation in the sector.

2. INNOVATION IN THE SERVICE SECTOR

2.1 Introduction: Service Features and Dynamics

24. There are several ways in which services typically differ from manufacturing (though there are many exceptions to such broad characterisations). Among the most central and commonly identifiable features of services are:

- **Intangibility** - the service product is often intangible (a factor that has several consequences). Services products are often hard to store and/or transport, they are difficult to demonstrate in advance to potential clients, and many are not readily protectable via Intellectual Property Rights such as patents.
- **Interactivity** – a high level of interaction with clients and consumers is frequently entailed in services-based enterprise. Consumption and production are often coterminous in time and space, which can mean that both the service supplier and client need to be at the same location. As with intangibility, this can create problems for trading services across countries. Delivery also becomes a particularly important issue for services firms, and the focus of much innovative effort. Further, clients are often involved in elements of design and production of the service, even where these are separated from actual service delivery and consumption. Finally, the interaction can continue after the main product is delivered – aftersales and customer support services, for instance, frequently constitute a component in service packages.
- **Information-Intensity** - the two features above imply that a great deal of information-processing is typical of most services. Information exchanges are naturally central to interactivity, and many intangible products are 'informational' in form.
- Other distinguishing features are also frequently observed. In terms of production and organisation, many service firms are of small **size** - sectors such as retail are populated heavily by microbusinesses. Other services are dominated by unusually large organisations – e.g. public services and financial corporations. Again with exceptions (such as the railway and telecommunications industries), many service sectors have featured low levels of **technology-intensity**, with more of their capital investment in buildings and less in machinery (when compared with manufacturing). Associated with this, many services have employed relatively unskilled staff, especially in terms of technological **skills** – although high-level professional skills and

in some cases specialised technical skills (such as surgery) are common. For many services, **regulatory** issues loom large. Many services are either run by the government or highly dependent upon state funding of a more indirect kind. Others are regulated (or self-regulated) because of the difficulties that clients face in determining the quality of a service product before actually consuming it (as noted above, intangibility and client-intensity make for difficulties in demonstrability).

25. These features interact with each other and with the barriers to innovation in services which we discuss below. The point has already been made that *intangibility* may pose problems for Intellectual property (IP) Protection, and some services are believed to be very vulnerable to simple copying. Services industries' *interactivity* means that products are often highly bespoke or customised to a particular client's needs (this can imply that innovations made *on-the-fly* in the course of producing particular services are not effectively captured and reproduced in subsequent innovations – or, when they are, it is more a matter of the memory and skill of professionals than of organisational learning). Furthermore, the benefits and even the IP of an innovation may accrue to the client rather than the service supplier.

26. Historically, interactivity has frequently implied the provision of services on a small scale and local basis, though in fact many services have been highly standardised and widely geographically diffused for a long time (consider railways and conventional telecommunication and broadcast services[12]). It is apparent that the growth of large-scale firms in other service sectors is also associated with increased standardisation, of a sort. McDonald's and other fast food restaurants are familiar examples of such firms; whilst it may be argued that they do not offer a gourmet experience, such outlets have brought affordable food of predictable quality to large numbers of consumers, and have provided a form of meal experience that is attractive to many customers. Fast-food chains also display a measure of customisation, in that their products are composed of various components, or modules, which can be combined in numerous ways according to customer demand; new modules may be added to create even wider ranges.

27. More widely, such *modularisation* is a common feature of the organisation of services innovation. Often this has been initiated by quality control procedures (which lead to an analysis of the component parts of service processes and products), but it often provides the spur to process innovation and new products and product combinations. Other impetus to industrialisation comes from the use of new ICT. This has made it possible to automate elements of the back-office work of many services and of large firms in other sectors, for instance through the use of Enterprise Resource Planning (ERP) software and systems. The

application of ICT to back-office work and the management of customer-facing services, such as mail and telephony, has significant implications for the spatial location of service activities (see below), and for the provision of customised services through the compilation of standard service modules. Telephone call centres (dedicated offices where the work revolves around the computer assisted answering of telephone calls, normally for the provision of routine customer service information) are an important case in point. Thus by 2000, about 1% of the UK workforce was employed in telephone call centres.

28. Trends in service internationalisation are complex: Foreign Direct Investment (FDI) and mergers and acquisitions are particularly important given the difficulties and obstacles that are encountered frequently in service companies' efforts to export services via conventional channels[13]. These trends are hard to predict, and managerial strategies and the application of new technologies are reshaping the picture. However, the USA has a marked lead in Internet services, with a disproportionate share of websites, Internet users, and well-known brands (e.g. Amazon). Though there are signs of a European 'catch-up' (and of continuing evolution in those areas in which Europe enjoys a lead, e.g., mobile communications and digital TV), much e-commerce and other service functionality is provided by US and US-based firms. There is a danger of further clustering of high value-added services in the US.

2.2 Service Innovation

29. The second Community Innovation Survey (CIS2) survey represents the first pan-EU effort to examine innovation in services. (This European Commission funded 1997 survey – in which all countries except Spain included services - followed up a 1991 survey that had been restricted to manufacturing in most countries, though this spurred a few countries to also examine services. A third survey has been conducted and data are awaited.) The CIS2 was restricted in reach, with most countries excluding public services and personal services (and retail) from the study. Also, firms sampled were of 10 or more employees, a factor that excludes more of the universe of services than of manufacturing firms (as noted above, many branches of services are highly skewed towards micro-businesses).

30. Whilst it is to be welcomed that CIS2 extends the coverage of innovation surveys to services, it can be argued that this instrument remains less than ideal for studying the services sector. One reason is that services often do not see what they are doing as technological innovation (understanding instead as *service development*). Innovation may be hard to distinguish from customisation or one-off service production; and the term R&D is often unfamiliar, with service

firms referring to 'project development', for example. Another issue is the lack of attention devoted to *organisational* innovation in the survey. Apart from problems specific to services innovation, a detailed analysis (of innovation in services) based on these data[14], warns further that country-by-country comparisons may be risky due to the methodology employed.[15] With these caveats in mind, some of the main results are discussed below.

31. First, the survey confirms that services firms are *innovative*. Just under half of the sampled service enterprises across the EU reported undertaking innovative activities between 1994 and 1996. This was slightly below the figure for manufacturers. Larger enterprises are more likely to engage in innovative activities, in most service branches. The difference between manufacturing and service firms' innovation propensities remains when firm size is controlled.

32. There are considerable variations between *different services*. The proportion of innovators was highest amongst the technology-oriented services, and lowest among more traditional services.

33. Service firms, contrary to some expectations, are active in the field of R&D. Just fewer than half the innovating service enterprises reported that they had engaged in R&D between 1994 and 1996. Indeed, a quarter of them reported having engaged in R&D on a continuous basis. Again, R&D is less common in innovating services than amongst similar manufacturers (controlling for size); nearly 70% of the innovating manufacturers conducted R&D. R&D is more common in large service enterprises, and in technology-oriented services. Many studies suggest that services rarely organise innovation in formal R&D departments, more often basing it on project development management (although some large, R&D-intensive services, such as telecommunications, maintain well-funded and long-established R&D laboratories).

34. R&D is not the only innovation activity; it is neither the most common one, nor the most important one for many services. Acquisition of machinery and equipment, acquisition of other external technologies (including software), and training directly linked to innovation (reflecting the importance of the human element for services) were found to be the most widely undertaken innovation related activities. These three mainly involve *bought-in technology* – innovation spend here is greater than on R&D. On average, *acquired technologies* accounted for the largest share of expenditures on innovation; while *in-house R&D* accounted for another quarter of total expenditures on innovation (its share was higher amongst technology oriented services). The range of expenditures among innovating firms was immense: the bottom quartile spent less than 0.33% of turnover on innovation activities; the top over 7%. Technology oriented services tend to spend most on innovation, but all sectors surveyed contain some very high spending (and some very low spending) enterprises.

35. The CIS2 study considered barriers to service innovation. Problems with Innovation were relatively common with almost half of innovators reporting some difficulties. The most frequent was a lack of sources of finance (about a quarter of the innovators). Other common problems were organisational rigidities, and lack of qualified personnel (a fifth of innovators), with skill shortages being the most widely cited problem for the firms that spent most on innovation on a per employee basis. Problems with customer responsiveness to innovation, standards or regulations, and lack of information, were cited only rarely (i.e., by less than 15% of firms).

36. Over a third of the innovating service firms claimed one or more of their innovation projects had been seriously delayed due to problems. A quarter claimed that projects had not even been started and 15% claimed that some had been aborted as a result of difficulties. Large enterprises were more likely to report innovation-related problems than smaller enterprises; perhaps because large firms tend to innovate more, or to pursue more radical innovations, and thus are more liable to have projects running into difficulties. However, large enterprises should also be more experienced innovators, with greater resources for innovation than small companies.

37. The CIS2 questionnaire provided only a narrow framework within which service firms could talk about their barriers, and some of the categories are decidedly ambiguous (e.g., what are 'organisational rigidities' exactly?) In our later discussion of barriers we will need to take up some themes stressed in the wider literature on services innovation which are not effectively captured in this survey.

38. CIS2 also covered sources of information for innovation (see Appendix 2). *Sources within the enterprises* were the most commonly cited, with about half the innovating service enterprises considering them *very important*. The role of internal sources was even higher for large firms and especially for computer, financial and technical service firms. A substantial proportion of non-R&D performing innovators reported that such sources (i.e. other than R&D) were very important for their innovation activities. This accords with accounts of 'professional knowledge' and 'knowledge gained from practice' as being important for services.

39. On a related point (and as noted above), one defining feature of many service industries is their high level of interactivity with clients. Not surprisingly, then, *customers* were the second most widely reported source of information for innovation; 80% saw them as at least *relevant,* and almost 40% as *very important* (they are particularly important for computer service and wholesale enterprises). *Competitors* are also significant as an information source (80% at least *relevant*; 20% *very important*), as are *suppliers* (20% *very important*). In contrast, the 'research system' (of universities, research institutes and patents) was rarely seen as an

important source of information for innovation; even amongst computer service enterprises, where only 10% considered universities to be *very important*. This accords with another line of argument about services – that they tend to be poorly linked into wider innovation systems, and the formal institutions that support them.[16] Though few innovators claimed that their efforts were hampered by a lack of information about technologies, or about markets, there is reason to believe that this lack of linkage does inhibit innovation.

40. Competitors, suppliers and customers were found to be the most common external collaboration partners. Answers to questions concerning 'Co-operation and Collaboration' display the same general pattern as those for sources of information for innovation to a great extent. One interesting point is that the relative places of customers (about a third) and competitors/suppliers (about 40% of partnerships) are changed, suggesting that the latter come more to the fore in providing the technical knowledge needed in order to meet customer requirements. *Consultants* and *research institutes* were partners to 30% of these enterprises, and a quarter had co-operative arrangements for innovation with *universities*. Relatively few innovating service firms (approximately a quarter) actually engaged in collaborations associated with innovation: such activity was more common among technology-oriented services and larger service firms (though at lower levels than that found among large manufacturing organisations).

41. Responses to a question concerning *involvement with Government innovation support programmes* reveal that (for the UK at least) innovating manufacturing enterprises are approximately five times more likely to participate than their counterparts in the services sector (whilst 16% of innovating manufacturers recorded some involvement in state-funded support programmes, only 3% of innovating services firms reported similar engagement). According to a report from the UK Department of Trade and Industry[17], this result reflects the nature of the support schemes and their bias in favour of the needs of industrial manufacturing organisations. The report also notes that the form of support sought most frequently by innovating organisations (both manufacturing and services) was that related to investment.

42. The CIS2 survey fails to specify the forms of technology involved in innovation. However, other studies have confirmed the centrality of new ICT to services. Thus a German study[18] found that *all* innovating service firms in Germany implemented ICT, even if they also applied other technologies. Until recently, there were few generic technologies that could be applied to service activities (for example, telephones, typewriters and vehicles). Their rate of change was relatively slow, they required relatively little configuration to meet the needs of specific users, and few service firms did more than acquire ready-made technology. This background helps to

explain why many service firms are poorly linked into innovation systems, and rarely have organised R&D management structures. The *ad hoc* nature of innovation management may have some advantages for services innovation, with the high involvement of professional staff and customers as sources of information. But another likely result is limited flows of knowledge within and between services firms, in turn limiting the adoption and uptake of technological opportunities and good practice in innovation. Combined with weak integration into innovation systems, and the heritage of institutions oriented to manufacturing activities, this would be expected to depress the pace of innovation in many services, even if the firms themselves do not report exceptional problems.

43. This is the picture, then, for services in general. In the course of this account we have noted that large service firms, and those in high-technology sectors, are often rather different. Many demonstrate a number of characteristics, features and propensities that are identified most frequently among organisations in the manufacturing sector.

2.3 Technology-Intensive and Knowledge-Intensive Business Services

44. In some cases large service firms are significant players in innovation across the entirety of their supply chains (for example, major food retailers intervene at the level of farming operations right through to food processing techniques, frequently imposing supply chain management and e-commerce systems upon their suppliers). Such firms are often sophisticated technology users, indeed the demand of the financial services sector for ICT skills (and its ability to pay high wages) has been seen as contributing to skill shortages elsewhere in industrialised economies. They have also been pioneers in some sorts of technology, for example data warehousing and mining methods, often as means of applying innovation to customer relationship management and related functions. While they may seem to be well-equipped to deal with innovations, they are frequently forced to confront issues surrounding, for example, the establishment of 'standards'. An emphasis on various forms of standards (see Section 3) is evident in a diverse range of services, including financial (for example, smart cards), media (digital broadcasting systems), and telecommunications and it is likely to spread to others as the advantages of common standards in many service applications become more visible in the course of technology and market development.

45. Knowledge Intensive Business Services (KIBS) may be large firms, but are more commonly small, if technology-intensive. KIBS include all kinds of business services that are founded

upon the possession of highly specialised knowledge and capability assets – whether these be the kinds of social and institutional knowledge assets involved in many of the traditional professional services, or the more technological and technical knowledge capabilities involved in many of the OECD's *strategic business services*. Some KIBS are based on administrative, legal, marketing, or similar knowledge. Others are directly based on new technology, such as Web and Internet, software and computer services. Yet more are organised around the production and transfer of knowledge about new technology (as in the case of information and training services, for example). The knowledge requirements for technology users are bound to be more challenging where new technology is involved, and where firms are thus less likely to have already acquired the knowledge necessary to understand, master, and utilise the new product and process opportunities.

46. CIS2 data show that technology-related KIBS sectors are among the most active innovators in the economy. They are driven by competitive pressures, if nothing else, to maintain knowledge about new technologies in their areas of expertise. Often they will also use these technologies, for their own internal functions or to perform services for clients. It has been shown[19] that, at least in Germany, technology-related KIBS are more likely than others to be producing specialised service outputs, tailored to client needs.

47. However, services engage in patenting far less than equivalent manufacturers, at least according to the relevant UK CIS2 data (c6% of innovating services as opposed to c.25% of their manufacturing equivalents). Another study[20] of UK KIBS (accountants, architects, and environmental engineers - selected so as to represent a range of relations to technology) has examined how they protected their knowledge. Management of *internal working practices* and *social relationships* with staff and business partners tended to be the primary axis of action; KIBS need to establish reliable and trust-based relations with their staff and their clients. *Membership of professional associations* was another important axis; these organisations deliver training, award professional qualifications and accreditation, and may also run self-regulatory systems, price-setting and recruitment networks. Reputation and trust are very important and play a central role in attracting and retaining staff and clients alike. A firm's participation in wider networks (of suppliers, clients, partners and competitors) helps define its reputation and may contribute to its perceived trustworthiness. As for intellectual property protection, the evidence suggests that standard instruments, such as patents and copyrights, are only relevant to those services whose products involve a great deal of hardware (patentable), or are embodied in reports and documents (copyrightable).

48. Many KIBS play important roles in innovation processes in their client firms and sectors. KIBS provide such clients with a broad range of service products and consultancy and these may include:

    - general information relating to operations and environments (relevant to technology decision-making across a range of issues that do or may affect individual firms);
    - the identification and definition of specific problems or classes of problems that may be confronting firms;
    - proposals for ways of dealing with problems or advice that is germane to the formulation of problem-related actions; and
    - the delivery of solutions (or parts of solutions), implemented by KIBS on a "turnkey" or long-term, contractual basis.

49. CIS2 data show that acquisition of external technology through use of consultancy services is the second most frequent mechanism used by manufacturing firms. (The most important mechanism is direct equipment purchases.)

50. KIBS staff are instrumental in generating novel solutions to the problems of client firms, and novel processes within the KIBS itself. They act as the interfaces with clients, implementing the role of KIBS as intermediary agents in innovation systems. They typically have expertise in some generic field of knowledge that they can apply (and perhaps develop further) in order to solve clients' problems. This means eliciting and organising client-specific knowledge, and fusing it with the more generic knowledge to create solutions. Thus as well as domain expertise, they require skills in interpersonal communication, presentation of materials, "impression management", and the like.

51. Macro-statistics confirm the high skill-intensity of KIBS[21], whilst other data demonstrates the rapid employment growth in these sectors[22]. Eurostat studies appear to indicate increases in both professional and managerial jobs; a heavily gendered division of labour; and in some countries at least, an entry of staff from manufacturing sectors (and from educational institutions designed to supply a skilled workforce to manufacturing industry). Similarly, according to UK survey data, KIBS staff are more likely to learn new things, to receive training, to work with computers, and to move between different types of work[23]. Alongside labour mobility as a means for diffusing knowledge around the economy, KIBS may provide an alternative route for "embodied knowledge" to be transferred. It may even be a superior route – in the UK study, workers moving between jobs were found to fare poorly on these indicators of "life long learning"[24].

2.4 Summary

52. This section of the report has outlined the nature and distinctive features of services and has alluded to the shifting dynamics of development activity and innovation in the sector. It is clear that the services sector (although internally differentiated) is characterised by a number of unique features. Such features (for example, client intensivity, product intangibility, information intensivity and dependence upon human capital) are typically shared across the broad sweep of services organisations and are the key factors that distinguish the latter from those firms that operate in the manufacturing sector. The section has also indicated that the nature and organisation of innovation in services (contingent upon its peculiar features) is distinctive when compared to that found commonly in the manufacturing sector. The following sections of the report will continue to explore the "uniqueness" of services enterprise and innovation by examining how this is manifest in the barriers and obstacles that frequently confront efforts to innovate in services and also to commoditise novel services offerings. The report will conclude by (a) making the case for a widespread recognition of the specificities of services at policy-making level and (b) providing an overview of the implications for policy if innovation in the sector is to be encouraged and supported.

3. BARRIERS TO INNOVATION IN SERVICES

3.1 Introduction

53. Given the central role allocated to innovation in the stimulation of economic growth, it is not surprising that much research has sought to identify *barriers* to innovative activity. Along with organisational, cultural and political impediments, studies have sought to highlight potential problems in the labour market and the regulatory environment. As a result of the ascending importance of services-based enterprise in all advanced economies, several recent investigations have attempted to examine the specific nature of constraints upon innovation in the services sector (a detailed discussion is included at Appendices 1 and 2). This section of the report outlines the key findings of some such studies (undertaken chiefly over the past decade) and synthesises the core issues that arise.

54. Before embarking upon this exercise, however, it is useful to note some important caveats. As indicated earlier, one of the defining characteristics of the services sector is its heterogeneity. Because of the diverse range of activities and industries that are included in the sector, barriers to innovation in services will vary. As a review of impediments prepared for the SI4S Programme[25] noted:

    a) *Different service industries experience different sets of barriers:* A broad spectrum of industries is embraced by the services sector. Each sub-sector is characterised by its own market dynamics and operating conditions (for example, development and production activities, access to human and physical capital, ICT intensity, competitive environment and market requirements). Various combinations of these give rise to unique impediments in specific industrial settings.

    b) *Firms of different sizes, structures and capabilities encounter different barriers:* Firm size, structure and capability vary dramatically within and between sub-sectors. For example, access to financial resources, R&D facilities and qualified staff varies. The mix of these factors (or their absence) in a particular organisation will impact strongly upon its ability to launch and sustain innovative activity. Moreover, the 'embeddedness' of a firm in relevant networks (of suppliers,

competitors, intermediaries, and consumers) will significantly affect its opportunities to undertake innovation and marketing activities.

c) *National regulatory regimes create country-specific impediments:* Since regulation is generated largely in the context of national political and legal systems, firms operating in different national territories are likely to encounter different regulatory settings and thus, unique forms and combinations of barriers to innovation.

3.2 Key Barriers to Innovation in Services

55. With the caveats above in mind, the following sections will consider the ways in which impediments to innovation have been conceptualised and characterised in recent studies. Aiming to provide an assessment of the most significant obstacles to contemporary services innovation, this report will examine four classes of barriers to innovation that are key and peculiar to services. These have been identified from the analysis presented above and from a detailed review of the wider literature on services innovation. The four are:
    1. Lack of Support for Trade and Internationalisation;
    2. Difficulty in Valuing and Financing Intangible Service Assets;
    3. Adequacy of IPR Protections; and
    4. Lack of Government Support for Innovation.

3.2.1 Barriers to Trade and Internationalisation: Impacts on Innovation

56. Manufacturing firms have traditionally begun supplying overseas markets via trade, extending this at a later stage through Foreign Direct Investment (FDI) where appropriate. Thus trade represents a relatively low cost 'entry' route to international sales and, if successful, can be reinforced subsequently with much higher capital expenditures. But the intangibility (and associated problems of storability and transportability) of many services implies that their suppliers cannot export them in traditional ways. Often services firms have to supply their products via physical presence (through FDI at an initial stage), or through other techniques such as partnerships, franchising and movement of people. This poses a much higher entry barrier to overseas sales, and government support, in the form of export guarantees, is not available. Trade problems are further aggravated by variations in professional standards and legal regulations across national borders. Often service firms do not bother to supply overseas markets at all, and as a result, cross-border trade in services remains modest.[26]

57. How do such problems and restrictions on trade and investment affect service innovation? Service innovation is affected because the potential additional growth and economies of scale obtained from exploiting overseas markets is not being achieved. Opening up overseas markets and thereby increasing overall market size will serve to increase the number and success rate of service innovations by improving the viability and profitability of new service introductions. This, in turn, will allow investments in innovation to be amortised over shorter periods and will reduce the risks and uncertainty associated with the launching of new service products onto the market. Services trade is important in other ways too. It can allow for innovative new entrants to establish a market presence (intensifying competition and allowing for experimentation with new service approaches); and it can be a medium for technology transfer (e.g. through the operation of KIBS) and for learning about emerging good practice in service production and delivery. All of these factors will generally speed the pace of innovation.

3.2.2 Difficulty in Valuing and Financing Intangible Service Assets

58. The CIS2 data demonstrated that financial difficulties were a frequent barrier to innovation, and a service innovation survey in Germany[27] found similarly that a shortage of finances was cited by 55% of firms as their most significant impediment to innovative activity. Smaller companies are much more likely to report difficulties in accessing funding than their larger counterparts. Service firms commonly blame their inability to innovate upon:

    (a) an absence of venture capital; and,

    (b) the allegedly unsympathetic attitude of financial organisations and banks towards service-based firms.

59. Assumptions relating to 'risk' constitute an important factor in lending decisions. The assessment models that are applied by financial institutions tend to have been developed in relation to manufacturing innovations (and may be problematic in the domain of services). The intangible assets on which innovative services depend are proving a major challenge for accountants and others to index, though much activity is now underway on this theme. As innovative service concepts – and small services firms! - have little inherent material security (for example, buildings, equipment and plant), banks tend to be reluctant to lend even small sums of capital. Even state-supported venture capital agencies are reticent in relation to service sector lending and it appears that grant administrators and financial markets alike have failed to recognise that services innovations might constitute a profitable focus for investment. While there remains much uncertainty concerning how capital markets value intangible assets

(and whether their practices here lead to undervaluations, volatility, bias against certain forms of innovation, etc.), it is likely that there are inefficiencies for both investors and policymakers associated with their present treatments.

60. The very short product cycles in the software business constitute a major barrier to investment. As development requires (expensive) expert input over a long period of time, high levels of investment must be matched by high volume sales immediately upon release of a new software product. Few financial institutions are prepared to risk extended and high level investment in a market sector that is perceived to be insecure and nominally capricious. As a consequence, the software industry appears to suffer from high search costs associated with finding investors for innovation and new product development.

3.2.3 Intellectual Property

61. It has often been argued that service innovations are easier to imitate than those generated in the manufacturing sector. The evidence is mixed, and this may only apply accurately to the non-technology-intensive services or to the secondary 'design features' of services. But what is apparent is that the ability to protect services innovations is problematic. Existing innovation-related Intellectual Property (IP) regimes tend to favour manufacturing organisations, and are focused pre-eminently around patenting. Patenting is rarely appropriate as a means of protection in the case of service innovations. As such offerings are more commonly protected by copyright or trademarking mechanisms (or by licensing arrangements in the case of software), the 'knowledge dissemination' function of patenting is circumvented, thereby erecting barriers to additional innovation in the field. (This also applies strongly to another means of IP protection widely used by innovative services, i.e., 'contractual agreements' with the companies with which they work.) And whilst some services firms are able to mobilise trademarks and copyright in defence of innovative designs and offerings, such protections are perceived to be inadequate; infringements are both difficult and expensive to defend (especially where infractions are committed by large and well-resourced companies).

62. In addition to the imitation of innovations by other suppliers (as in the appropriation of the original ideas that underlie a new piece of software, a new form of bank account or a novel way of delivering retail services), there are issues connected with the copying of service products themselves. In particular, the growing importance of information-based products, and the increasing ease of reproducing and distributing such products via computers and the Internet, have meant that suppliers in media, software and several other sectors have become increasingly concerned in relation to "piracy". Many providers were initially reluctant to go online for fear of piracy (slowing the development rate of ecommerce), but this response is

decreasingly viable. The problem of copying is liable only to grow in magnitude, despite efforts to protect information products by technical means or by tighter enforcement of IP regulations (mainly copyright).

63. An associated set of concerns relates to data protection and other issues connected with the accumulation, sharing and trading of digitised information. Increased public concern and related 'data protection' legislation have meant that it has not been possible to launch some consumer services innovations. For example, prevention of the use of customer data for marketing purposes has dented some planned commercial enterprises and has restricted innovation in mobile communications. Similarly, fears concerning data security and the prevention of data leakage have retarded efforts to construct electronic information exchange facilities both within the public sector and between public and private agencies.

3.2.4 Government Support for Innovation: Manufacturing-Oriented Policy

64. Government R&D and innovation support policies have typically been developed to meet the needs of manufacturing industry. Sometimes these have precluded applications from service firms, and often they have not been "marketed" towards such organisations (devised and operated as they are by agencies that are not accustomed to working with the services sector). Most support organisations (e.g. Industrial Research Associations) are aimed at manufacturing. Much innovative activity in service organisations does not take the form of traditional (technological) R&D: it is for example *ad hoc* and human capital-intensive in nature. A failure to recognise the specific needs of the services sectors slows the dynamics of their development and sustains an environment that is at best not congenial - and at worst hostile to – the growth of innovation in this domain.

65. Often service companies, in particular those associated with software and multi-media services, operate on short product innovation cycles (Section 3.2.4) and the extended 'lead time' that is associated with the delivery of public grants has meant that many service companies rarely perceive government funding as applicable to their (service-oriented) needs. Protracted decision and delivery periods mean that the potential value of an innovation will be totally degraded by the time that government monies are made available to support research and product investment.

66. Market research and market launch activities are considered by many service firms to be critically important components in the innovation process and few companies are prepared to undertake innovative work without due attention to such preparatory measures. However, public funding programmes rarely offer resources for such activity (legislation may preclude

support for ‘near to market’ activities) and this situation is perceived as a significant further barrier to take-up.

67. Lastly here, the high, and perhaps more importantly, unpredictable, cost of innovation represents a significant barrier to many service organisations, a substantial proportion of whom are microbusinesses. Reluctance to invest in innovation has been reported in recent studies and companies express a fear that development and marketing costs will result in a requirement to launch new offerings at a price that is unrealistic given prevailing market conditions.

3.3 Summary

68. The study has identified four major barriers to service innovation from its review and analysis of research into this field. The following section will now outline policies that seek to overcome these barriers in service innovation, thereby offering improved growth and productivity performance within national economies as a whole.

4. POLICY FOR STIMULATING SERVICE INNOVATIONS

4.1 Introduction: Raising Awareness of Services among Policy-Makers

69. Policies directly aimed at service innovations are rare, though there are signs that these are gradually becoming more common. Given the preponderant focus on manufacturing sector innovation in the past, there is clearly room for much more attention to services innovation policy. There are rationales for this in terms of competitiveness, economic growth, quality of life and employment. In this latter respect, Frits Bolkstein, the Internal Market Commissioner, has noted "The service sector in Europe offers huge potential for growth, competition and employment. If the EU employed the same percentage of people in the service sector as the US, we could create 36 million new jobs".[28]

70. Several major policy trajectories are related to services, or rather to particular branches of services; these include public services and services that are strategic in the sense of being responsible for major infrastructural or financial arrangements. The implications of these policies for innovation need to be studied, and in some cases the policies may deliberately incorporate a stimulus for innovation.

71. Lastly, when devising service innovation policy, it is important to acknowledge the diversity of different services; a "one size fits all" approach to policy formulation will often be misguided.

4.2 Trade in Services and Service Innovation

72. Obviously, reducing trade and investment barriers in services will do much to help foster a better and larger market environment for service innovations. It will lead to more innovative service offerings, as well as encouraging service firms to investigate new forms of service delivery across much wider markets.[29] By starting to serve overseas markets, service companies will also be more likely to encounter a more novel and diverse set of consumers, and in turn may avoid the 'lock-in' of providing for a 'served market' of more conservative, domestic customers. In other instances, service firms will gain because their domestic markets have already reached saturation levels for the services that they offer.

73. Key barriers identified by service firms centre on: differences in national technical standards; lack of mutual recognition of qualifications; the inability to practice without a licence; restrictions on multidisciplinarity practices; differing and restrictive employment regulations; and

differences in accounting, tax and legal systems[30]. Reducing these barriers would do much to stimulate cross-border service trade and investment and improve the underlying innovation environment for services.

74. FDI may involve higher financial burdens than does direct trade. How should service companies be supported if they are forced into FDI in order to 'serve' their markets via physical presence? Larger service companies may well obtain grants and subsidies from host governments to attract them into a national territory. However, smaller service companies are simply overlooked. For those who have a degree of substitutability between trade and investment, there is the option of undertaking conventional trade whilst remaining located in their home base. For other small firms, this is not an option, and the challenge for policy for exporting countries may be related to establishing common facilities for smaller enterprises (advice and training, etc.)

75. Another set of barriers identified by business service firms relates to the administrative procedures and cost involved in setting up an overseas company (and to restrictions on legal forms, affecting those who deliver services by means of a local subsidiary). Again it is incumbent upon host countries to try to reduce these barriers, but such countries would benefit in the long term through reciprocal arrangements for domestic companies seeking to establish units abroad, and through a more efficient and competitive market for such services.

4.3 Valuing and Supporting Intangibility

76. In many service sectors the value of the company is associated with intangible assets such as human resources, brands and trademarks, and non-IPR protected 'know-how'. (As usual this characterisation does not apply to all services - transport is one exception.) Accounting standards are such that service firms can still find it difficult to raise capital to commence operations (via start-up and venture funding or Initial Public Offerings) and, more especially, to initiate or continue the expansion of their companies. Internet–based companies in early 2000 may have found it easy to gain funding (in the "dot com boom"), but their subsequent collapse has, not surprisingly, made it harder for service companies to gain full valuation and financial support. Additionally, since it is hard to measure the impact of many service innovations, it can be hard to justify the cost of innovation-oriented expenditures within companies.

77. A key policy focus should centre on revising and standardising accounting procedures and instruments in order that these can properly reflect the true value of firms' intangible assets.

Some national accountancy agencies have already set up reviews to do this, but there is a need for the harmonisation of European accountancy criteria for this to be fully effective.

78. A second aim would be to encourage specialist start-up and venture operations that specifically target promising service companies (as there are already are on a sectoral, regional or national basis). Such operations would become attuned to the difficulties but also the real value of the new service ventures they funded. They would also help to inform the wider institutional and governmental base in relation to the value of services within the economy as a whole.

4.4 Intellectual Property Protection

79. Some services (for example, the media and cultural industry, information and consultancy services, and web design and architecture firms) generate products that are largely 'informational' in character, i.e., they can only be captured in texts and recordings. New ICT dramatically increases the reproducibility and 'distributability' of such products, as the music industry's battles with Napster demonstrate vividly. Similar types of IP issue may arise in the context of many other services. The move to close down file-sharing facilities is highly problematic; these are innovative services themselves, often used in quite legitimate ways, and pushing forward new 'peer to peer' (P2P) methods of networking and information exchange. (Such P2P processes are liable to be the basis of important economic and social activities in years to come – and are likely to prove unstoppable, in any case.) Instead, information providers should be encouraged to work on ways of reducing the 'copyability' of their products, and on means of asserting ownership, such as watermarks. Even though such techniques are inevitably subject to a "technological arms race" as hackers (and in some cases, legitimate users) attempt to subvert them, it is possible to increase the incentive for users to respect IP by, for example, bundling additional services or material components together with the core service product.

80. The protection of intellectual property in services is thus an extremely difficult and complex issue. This is manifest, too, in the lively debates surrounding patenting software and business processes. Here there are strong currents of opinion within industry and society at large about the need to follow - or find alternatives to - the US route in expanding the scope of patents. One line of opinion suggests that shorter-lived patents may be a compromise that can protect IP while not hindering innovation too heavily. An effective balance between reward to inventors in the short run, and encouragement to diffusion and competition in the longer run, must remain a policy goal. IP instruments such as copyright fail to achieve this goal

sufficiently, and the use of such measures to cover technical innovations requires careful monitoring. It may be that new forms of IP protection, more appropriate to services, are required. These would need to take into account the problems that many small service firms encounter with the bureaucracy and cost of existing IP systems.

81. But an important message from the study of services innovation is that services sectors and industries are extremely differentiated in terms of their IP needs and strategies. Different instruments are typically used, and further changes are underway as the role of intellectual assets is becoming more widely recognised. IP regulations need to be framed with this diversity in mind: models based merely upon the views of the most vocal sectors (or lawyers) may well fail to suit others.

4.5 Lack of Government Support for Service Innovation

82. Services, even innovative service firms, tend to undertake R&D to a lesser extent than comparable manufacturing firms. They often, however, place more emphasis on other innovation-related activities - for example, training - and on organisational innovation (though the picture varies across sectors). Thus, innovation policies for services should not be reduced to R&D policy, although tax relief for R&D would almost certainly increase the visibility and recording of R&D in service firms, and possibly lead such firms to conceptualise more of their innovative activities as being R&D[31]. A wider spectrum of innovation-related activities, and the instruments that may efficiently and effectively facilitate these, need to be considered.

83. Innovation support programmes should recognise that services often rely on sources other than formal R&D for innovation. However, R&D programmes should be available to services as well as to manufacturing enterprises. There is scope for addressing programmes specifically to the research challenges that confront services industries.

84. The service companies to involve in such RTD are manifold; the need is not just to involve those concerned with ICT, media, and communications. Postal services have played important roles in developing technologies for disabled people for example. RTD programmes should seek to involve human and physical services, public services, and technical and professional services. RTD programmes are sometimes accused of seeking 'technological fixes' - that is, of only looking for technological solutions to problems. In some cases, social and organisational change may better address their sources or symptoms. In other cases, however, costs or social resistance may make technological solutions most appropriate. More generally,

technological changes are liable to form part of the solution, alongside necessary organisational and even attitudinal changes.

85. The scope for innovative programmes may well go beyond the areas of social need that are conventionally identified. While some social needs have substantial lobbies behind them, other (perhaps even more pervasive) needs are poorly articulated into media and policy discourse. This may be partly because opportunities for common application of new modes of service delivery have been poorly explored. There may well be numerous opportunities to combine social and technological innovation to generate new private and public services that can enhance Europe's quality of life and economic capabilities. Mechanisms need to be developed to improve the identification of such possibilities, and to assess their contribution to the different objectives that lie behind RTD programmes. For example, "social" NGOs would like to play a greater role in consultation concerning EC programmes, and this could be an opportunity for renewal of RTD activities.

86. Services, given their heritage of low involvement with technology and innovation systems, and the SME nature of many service firms, may face barriers to the use and further development of even generic technologies such as new ICT. Some existing EU RTD programmes have focused on the development of technologies and applications with specific relevance to services, for example, telematics RTD for health and administrative services under the TAP framework. Further, some European-level technology development and diffusion programmes are explicitly oriented to service providers and users ('transport and logistics' and 'Information Society' initiatives in particular). Programmes in education and training, critical human resources for RTD, both draw on and support services.

87. The TASC study[32] for NIST pointed to a range of technologies of relevance to many services that could also be the focus of RTD: electronic commerce technology, speech recognition technology, and set-top box technology (for digital TV). They stress the need to develop formal methods to identify such generic technologies (they also use the term "infratechnology") to support the service sector (in the same way that NIST traditionally supports manufacturing through participating in voluntary standards organisations, developing tools, databases, and reference materials, and providing support for performance assessment and conformance testing).

88. In Sweden, the SI4S project noted a technology program introduced in the 1990s to improve use of ICT in the service sector. Subsequently, projects supporting the use of ICT and ecommerce in the public sector have proliferated, and various e-commerce programmes support private service businesses.

89. Most existing innovation systems are not effectively geared towards services and the requirements of such industries for human, social and administrative knowledge. The orientation of formal institutions (for example, industrial support systems) tends currently to be towards manufacturing, while less formal networks are also better-established in non-service industries (with some exceptions in high-tech services). The situation varies across sectors and countries: where active trade organisations and industrial fora in service industries are in existence, they tend to be involved closely in policy initiatives, as intermediaries and also as co-designers of policy. More generally, several lines of policy action are suggested from the analysis above. These are grouped into Service Innovation Centres, Foresight activities, and other Awareness and Benchmarking activities. Each of these mechanisms will be discussed briefly below.

90. A form of R&D institution that could fit with service innovation is the 'service innovation centre' (or laboratory). Effectively these are RTOs that are oriented to service industries or functions. E-commerce is one area where there has been some movement toward establishing such facilities, though at present there seems to be something of a gap between more academic, computer-science based research groups, and more industry-based associations aimed at raising awareness, consolidating standards, and influencing government policies. In the UK, for instance, the Centre for Excellence in E-commerce pursues long-term research on ICT, usability, and related topics.

91. The notion of service innovation centres could be developed in many other service areas, on regional, national and international bases. While there is a role for basic and strategic research (and especially for networking with Higher Education Institutions (HEIs) pursuing such work) the market orientation of most services suggests that such facilities will be most effective if they avoid being seen as largely science based, or technology-push driven. The precise models will vary from service field to field. A group working on topics such as biometrics and identification of customers (and service personnel) might have a strong emphasis on technology, but often professional and employee-based knowledge will be to the fore. Methods of "capturing" and augmenting such knowledge, translating it into new applications and interfaces, and testing the usability of new service concepts for service workers and customers alike, would thus be pursued.

92. Such service innovation centres could also perform technical functions such as standards-development and compliance testing: these are discussed at more length below. And it is also possible to consider the scope for reorientation of existing innovation centres to take more services issues into account. In Sweden, the SI4S project noted an effort to reorient the state

department for industrial and technical development, to encourage its R&D department to focus on services alongside more familiar areas.

93. Foresight (and similar approaches such as "strategic prospectives") takes different forms in different countries and regions. Sometimes it has been an expert-driven approach, aimed at producing strategic guidance and priority-setting via published reports and similar outputs. Sometimes there has been much more of a process focus, aimed at using the tasks of developing such strategic analyses and opportunity to build and strengthen networks linking together numerous actors, including researchers, entrepreneurs, policymakers, marketing experts and financiers.

94. In most cases, Foresight activities have been strongly oriented towards manufacturing sectors, though increasingly Foresight programmes have sought to involve services. This was stressed as an objective of the UK Programme, where there was a notable effort to build in services like retail and distribution, finance, transport and (to a more limited extent) entertainment, medical and education services. There were problems associated with mobilising key actors in some of these groups. These were indicative of service managers' lower propensity to identify their activities with technological innovation. There also seems to have been difficulty in recruiting and mobilising players from more traditional service sectors. These difficulties reflect many services' weaker linkages into innovation systems.[33] The implication is that special efforts may be required to bring services into Foresight. To the extent that Foresight involves constructing better and more dynamic innovation systems, it would seem to have a particularly important role to play in services, where innovation systems are often weak.

95. In addition to innovation centres and service laboratories, public authorities can play a role in developing or sponsoring innovation networks focused on services. These would study successful innovation in services with the aim of offering advice in relation to best practice and identifying common pitfalls. They can use events (like conferences and workshops) and web-sites to provide information and contacts online, and techniques such as competitions and awards to raise awareness and reward excellence. Firm-level benchmarking, so as to identify, explicate and communicate good practices in innovation and the organisation and management of innovation-related activities, are an important element of knowledge transmission for service firms (especially the smaller firms that have less access to costly consultancy services).

96. One instance of policy initiatives taking this form comes from Germany. The BMBF (the Federal Ministry for education and research) initiated *Dienstleistungen 2000 plus* – a network for innovative services firms to exchange information. This has become '*DL2000.de*', a

Community aiming to become a self-supporting membership-based organisation, exchanging information about the service economy, best practice and current research results.[34] Associated with this, the BMBF sponsors a series of conferences for service researchers and practitioners, aimed at further raising levels of understanding of innovation and innovative practices.

97. A related activity is the development of technology "roadmaps" (and methods to produce them). The high levels of uncertainty among service providers and users associated with the continuing rapid uptake of and change in ICT creates challenges for managers, customers, and investors. It has been found that services were often postponing technology investment decisions due to high risks and uncertainties associated with lack of knowledge about (and on the part of) customers. Some efforts to create such 'roadmaps' have been undertaken by the IPTS and in the course of some of the national Foresight programmes.

98. Interfirm networking is discussed above: its complement is the enhancing of systematic "absorption capacities" (to use innovation theory jargon) on the part of member or client firms. Again the specific features of services are of some importance here. Perhaps the most important features of innovation capacity are connected with human resources and this is treated separately since it is such a central feature of services.

99. The poor development of innovation systems to support the services sector is not the only feature of the heritage of (many) service enterprises being new to innovation. There is also likely to be an underdevelopment of management capabilities to induce and carry through innovation processes within individual service firms. These capabilities could be improved by the provision of service management training courses, the inclusion of components concerning services in technology and innovation management courses, and by more focus on innovation management in services in business schools. Further benefits could emerge from the provision of guidance information, training materials, awards recognising good practice, and even demonstration programmes. Both private initiatives and public authorities could have a role to play here and new media could be used as one means of dissemination.

100. However, it is inappropriate to be heavily prescriptive with respect to how innovation in services is conducted. Service firms might benefit from adopting the precise mechanisms used by their manufacturing counterparts; but there may be good reasons for their having evolved different strategies. Opportunities for the exchange of information concerning modes of managing innovation (and what criteria may be useful to distinguish good practice) would probably be valuable. Activities to familiarise services (perhaps KIBS and SME service firms in particular) with the ideas and practice of R&D and innovation support and management, and to

locate these firms more securely in innovation networks, could include campaigns and awareness-raising seminars. The service innovation centres postulated earlier could play a role as observatories and communication centres, in support of such activities. Thus they could generate and disseminate knowledge about the trajectories of service innovation, alternative modes of organising innovation activities, and the availability of support for innovative enterprise. In essence, the goal should be increased awareness of innovation possibilities and strategies among a wider range of service firms. This would also help inform policy measures and the evaluation of such measures. Public policy in support of innovation management would seem to be particularly relevant for SMEs and KIBS (given their importance to innovation systems more generally).

4.6 Conclusions

101. Many service firms will undoubtedly continue to be "laggards" where it comes to innovation. This is not surprising, they are micro-businesses (employing less than 10 employees), often run on family labour, using little in the way of advanced technology and having limited resources of time or finance to devote to upgrading their operations. Such firms might be regarded as traditional and even archaic. However, they may contribute in important ways to the cultural fabric, so ways of helping them survive in the face of competition from more dynamic, large-scale service firms may be worth exploring. For instance, many SMEs are extremely pressed where it comes to innovating in the field of ecommerce - meeting the challenges of designing, implementing, maintaining and acting upon websites are immense by their standards. But such functions could readily be provided by specialised KIBS operating at a community level, and there is scope for local authorities and others to stimulate and facilitate such support.

102. The most important message of this study is that there is considerable potential for services to be (more) innovative, but that many branches of the services sector, and many firms, especially SMEs, are poorly linked into innovation systems. A policy priority should be to examine how far the formal institutions (and less formal networks) through which innovations are developed and diffused could be better oriented towards services. It is likely that the result will lead to developments in two areas. First, the reorientation of some existing institutions towards the requirements of services sectors and functions. Second, the establishment of new and dedicated formal institutions (for example, service innovation centres), and the allocation of support for informal networks (via, for instance, Foresight-type activities).

NOTES

[1] See Crum and Gudgin (1977).

[2] Compare with comparative data on OECD DSTI/EAS website.

[3] Edwards and Croker (2001, 7).

[4] Howells (1989)

[5] A similar process occurs for consumers who can acquire final services, or purchase goods to generate their own service functions - in this case the trend has often been toward "self-services" (see Gershuny and Miles (1983).

[6] Scarpetta et al. (2000)

[7] Fisk and Forte (1997).

[8] Mason, Keltner and Wagner (1999)

[9] The 'productivity paradox' is associated most closely with the work of economist and Nobel Laureate, R. M. Solow. His contention (1987) "You can see the computer age everywhere but in the productivity statistics", triggered an ongoing debate concerning the relationship between ICT investment and improvements in labour productivity.

[10] Pilat, D. (2001).

[11] Riddle, D. (2000).

[12] Hipp et al (2000) show that a majority of German service firms consider their outputs to be largely standardised. The least standardised of the sectors considered were business services such as technical and computer services. Similar results are reported from other countries.

[13] A wide-ranging discussion of obstacles to the internationalisation of trade in Business Services can be found in CSER (2001).

[14] Tether et al. (2001).

[15] The problem is less one of variations in methodology than of the survey design itself. Counties did vary somewhat in their sectoral and size-based sampling frames, but submitted broadly comparable data in these terms to Eurostat. However, a filter applied early in the questionnaire to determine the firms to be fully investigated does not seem to have yielded strictly comparable samples from country to country.

[16] Miles (1999).

[17] Thomas and Jones (1998)

[18] Licht and Moch (1997).

[19] Hipp et al. (2000).

[20] Miles and Boden (2000)

[21] Miles (1999)

[22] Murphy and Vickery (1999).

[23] Tomlinson (1999).

[24] This result may however, be peculiar to the UK and/or to the recession being experienced at the time of the study (which would tend to increase downward mobility).

[25] Preissl (1998)

[26] Centre for Strategy & Evaluation Services (2001).

[27] SI4S (1998)

[28] Bolkestein's comment (January, 2001) was made in relation to the launch of the European Commission's strategy to improve the practical operation of the internal market by dismantling any remaining barriers to the provision of (and trade in) services in the European Union.

[29] Centre for Strategy & Evaluation Services (2001), p. 85.

[30] Centre for Strategy & Evaluation Services (2001), p. 109.

[31] Howells et al. (2001).

[32] TASC (1998).

[33] See Miles (1999) for a detailed analysis of services' participation in Foresight in the UK.

[34] Located at **http://www.dienstleistung2000.de/main.php3**.

REFERENCES

Bolkestein, F. (2001) “Services: Commission Launches New Strategy to Dismantle Remaining Barriers” European Commission, Internal Market Directorate, Brussels (*on-line at: http://europa.eu.int/comm/internal_market/en/services/services/services.htm*)

Centre for Strategy & Evaluation Services (CSES) (2001) “Barriers to Trade in Business Services”, final report to European Commission, DG Enterprise (January 2001) (Available on-line at http://europa.eu.int/comm/enterprise/)

Fisk, D. and D. Forte (1997), “The Federal Productivity Measurement Program: Final Results”, *Monthly Labor Revie*w, May, pp. 19-28.

Gershuny, J. I. and I. D. Miles (1983) The New Service Economy, London, Frances Pinter

Hipp, C., B. Tether & I. Miles (2000), “The Incidence And Effects Of Innovation In Services: Evidence From Germany”, International Journal of Innovation Management December 2000 pp 417-454

Howells, J., (1989) “Externalisation and the formation of new industrial operations: a neglected dimension in the dynamics of industrial location” Area 21,289-299.

Howells, J., (1999) “Research and technology outsourcing” Technology Analysis & Strategic Management 11, 17-29.

Howells, J. Cox, D. Tether, B. (2001), UK R&D Strengths in ICT, Electronics and Communications (ITEC) and Creative Content Industries, Report prepared for the ITEC Panel of the Information Age Partnership, Department of Trade and Industry, London.

Levitt, T. (1976) “The Industrialization of Service” Harvard Business Review September

Licht G., and D. Moch (1997), ‘Innovation and Information Technology in Services” paper presented at CSLS Service Sector Productivity and Productivity Paradox Conference (Ottawa, Canada, April 1997)

Mason, G., B. Keltner, and K. Wagner., (1999) Productivity, Technology and Skills in Banking: Commercial Lending in Britain, the United States and Germany National Institute of Economic and Social Research, London, Discussion Paper No. 159

Miles, I. (1999), "Services and Foresight", Service Industries Journal vol. 19 no 2 pp 1-27

Miles, I. & M, Boden (2000) "Services, Knowledge and Intellectual Property" in B Andersen, J Howells, R Hull, I Miles, and J Roberts (eds.) Knowledge and Innovation in the New Service Economy Aldershot, Elgar

Murphy. M., and G. Vickery, (1999) Strategic Business Services Paris: OECD.

Pilat, D. (2000) "Innovation and Productivity in Services: State of the Art" in OECD (DSTI) Innovation and Productivity in Services Paris, OECD

Preissl, B. (1998) "Barriers to Innovation in Services", Report to SI4S Project (SI4S Topical Paper), STEP Group

Riddle, D. (2000) "What Do We Know About BDS Markets?", Service-Growth Consultants Inc., Vancouver, Canada.

Scarpetta, S., A. Bassanini, D. Pilat and P. Schreyer (2000), "Economic Growth in the OECD Area: Recent Trends at the Aggregate and Sectoral Levels", *OECD Economics Department Working Papers* No. 248, OECD, Paris.

Sundbo, J (1998) The Organization of Innovation in Services, Roskilde, Roskilde University Press.

TASC, 1998, The Economics of a Technology-Based Service Sector, National Institute of Standards & Technology Program Office, Strategic Planning and Economic Analysis Group, January 1998 NIST Planning Report 98-2.

Tether, B. S., Miles, I., Blind, K., Hipp, C., de Liso, N. and Cainelli, G. (2001) "Innovation in the Service Sector: Analysis of Data Collected under the Community Innovation Survey (CIS-2)', Report for the European Commission within the Innovation Programme, CRIC, University of Manchester, UK.

Toivonen, M., (2000) Growth and Significance of Knowledge based Services Helsinki, Finland, Uusimaa TE Centre Publications.

APPENDIX 1 BARRIERS TO INNOVATION IN SERVICES

Introduction

103. The main report has outlined the key barriers to innovation (i.e., those that display a high degree of distinctiveness). However, there remain other barriers that services share with other sectors, or which are have a less identifiable service 'angle', which are also of significance to service firms. The study has therefore sought to provide details of other research and analysis relating to obstacles to services (in particular, drawing substantially on the work of Preissl, 1998) and has summarised their main findings and conclusions in the remainder of Appendix 1. Appendix 2 provides more general EU-wide studies of service innovation that also highlight some of the impediments to innovation in services.

Technological and Market-Related Barriers

Technical Barriers:

104. Technical problems are rarely cited as an impediment to innovation; technology-oriented organisations are commonly aware of developments in their field and less technology-dependent firms are unlikely to acknowledge competence and capability deficits. The position of this latter group, whilst not surprising, may be a cause for concern. Studies have demonstrated repeatedly that an absence of technological capability can represent a significant barrier to the productive implementation of technology-based systems within purchaser organisations - an insufficiently qualified workforce is unlikely to be able to exploit new ICT systems to an optimal level and a significant 'bedding-in' period is not uncommon. Geographical and industrial differences are pronounced in this field and some countries and sectors have developed advanced capabilities in relation to innovative adoptions.

Information Technology:

105. New ICT equipment is widely used in services, and can be an important support to the provision of services of more consistent quality. There have been many attempts to encourage the uptake and efficient use of new ICT, and sometimes these have been aimed at services.

106. The use of information technologies for the provision of customised services, perhaps through the combination of standard modules in service packages, should be encouraged, in appropriate circumstances, as a means of providing quality services at reduced costs. Many new service products, and elements of many existing services, could be developed, supported and delivered via ICT networks.

107. This raises several issues of policy relevance (and issues that may constitute barriers to innovative activity or the diffusion of innovations):

- First, of course, is the provision of high quality access to ICT networks and services.
- Second, standards are important in terms of high-quality standard systems being important in achieving critical mass for new modes of service access (note the role of the Web in making the Internet a mass medium, for example). High-quality here refers to such features as user-friendliness, accessibility to disadvantaged groups, security, reliability. Thus a US study (TASC, 1998) makes a similar point, and argue that "while the design and development of such interfaces may be largely a private sector responsibility, evaluation methods and techniques for assessing the quality of customer interfaces has important "public" aspects and could yield benefits across the service sector in terms of hastening customer acceptance".
- Third, interoperability is also a key issue here (TASC, 1998). Heritage and futureproofing problems are seen as affecting many services and the need for interoperability across different networks, platforms, and services may be highlighted. For example, transport telematic systems need to be designed so that travellers using a wide variety of interfaces can access relevant information and services across Europe.
- Fourth, service firms need to be able to anticipate ICT developments. Service innovation centres can play important roles in monitoring, and fostering awareness of, trends in these technologies and their applications.

Standards:

108. New ICT raises several issues concerning the establishment of common standards (as noted above). Common standards can provide level playing fields (a) for service firms to develop their innovations and (b) in creating awareness that users will be able to employ them

within the context of their existing skills and technical platforms. This should relieve an obstacle to services innovation.

109. Europe's success with mobile telephony is often associated with the introduction of the common GSM standard (whereas in the US lack of a common standard made uptake, and industrial innovation, slower). There are liable to be other circumstances where common standards will be seen as helpful for European industrial and service innovation. Public policies, including government procurement and awareness activities, can help the definition and dissemination of standards. However, standards-setting is often criticised as unduly slow and cumbersome, and as also sometimes focusing on the wrong parts of fast-moving targets. ICT in particular develops at a very rapid pace. This has strained traditional standards-setting bodies and has led to a range of experimental and/or industry-led mechanisms. Given the generic nature of the technology, and the need for interoperability noted above, it is important to foster the rapid development of standards that can allow innovation to proceed rapidly, with participation from highly informed players in the process.

110. A related question concerns the 'openness' of standards. On the one hand, open standards encourage competition; on the other hand, technologies that become *de facto* standards can consume enormous resources in development. This raises the problem of rewarding intellectual property investments, and protecting intellectual property rights. There has been a move towards "anticipatory standards" so that standards-setting is becoming more closely entwined with R&D itself (even if markets determine which of several standards becomes the *de facto* common standard). This suggests that there is a role for public laboratories and RTOs in assisting and monitoring these processes, not least to represent user interests and provide channels of communication to the service users of emerging standards. There is also an important role to be played by collective action among members of service sectors influenced by such developments, possibly with the help of service innovation centres as discussed earlier.

111. More generally, the problems that service customers face in knowing about service quality in advance of purchase might be eased by wider use of quality standards and accreditation. Professional standards are at least as significant as technical standards in many services, particularly in professional services such as accountancy, law or medicine.

Political Factors: Legislation, Regulation and Administrative Rules

Introduction:

112. Both governmental and non-governmental political issues (for example, fiscal policy, industrial support policy, IP regimes and the activities of political interest groups) are frequently cited by commercial organisations as factors that can frustrate or undermine attempts to develop services innovations. A number of the key issues relating to the role of political factors on innovative activity are outlined below.

Regulation:

113. Regulation *can* be beneficial in generating an environment that is conducive to innovation (for example, by sponsoring the search for solutions to problems of environmental control or by ensuring the establishment of broadband infrastructure). But it is more commonly perceived as an impediment to innovation. Regulations and standards may be implicated in handicapping some forms of innovation but more generally, these are factors in the *shaping* of innovation, (i.e., in fostering its development along certain pathways). Nonetheless, some firms complain that regulation imposes higher costs (as companies strive to fulfil legal requirements or to work within rigid profit & performance parameters) or that increased risk (contingent upon the erosion of potential returns from development work) actively deters the application of innovative effort.

114. Although the increasing harmonisation of European legislation and regulatory policy is expected to have some implications for service-based innovators in the EU, the nature of these is likely to vary according to specific industries and geographies. Whilst the liberalisation of regimes may encourage innovation in some territories, and the entry of foreign competition where this has previously been absent, innovation in others may be deterred via the imposition of additional barriers, requirements and conditions.

115. Fears relating to regulation, and assumptions concerning its eventual dimensions and consequences, are often reported as a barrier to innovation. Legislative processes are almost invariably protracted. Some firms indicate a disinclination to innovate prior to the emergence of pending legislation (to do so would be to risk investment in programmes and products that may subsequently be undermined by regulatory interventions). Similarly, the potential for political change (contingent upon the outcome of elections) is perceived as a barrier to service innovation; companies may choose to defer investment until the political preferences and programme commitments of incoming administrations are fully elaborated. It is notable too, that purchasing behaviour is affected by political flux; clients of service providers are likely to

defer purchasing decisions until the outcome and implications of political changes has been absorbed.

Barriers to Market Entry:

116. Specific regulations within target territories determine opportunities for innovation to a significant degree and in some instances may disbar certain organisations from entry (for example, a 'physical presence' in a target country is sometimes a legal pre-requisite for the launch of financial services offerings). Most companies accept that legitimate consumer and creditor protections must remain in place. But some services organisations complain that related legislation (i.e., the statutes that enshrine such protective mechanisms) is frequently vitiated by less reasonable market seclusion clauses.

Labour Market Legislation and Fiscal Policy:

117. Policy in relation to taxation and labour market regulation is frequently considered by innovating organisations (and by their representatives in Employers and Trade organisations) to re-enforce obstacles to their efforts. Whilst some professional organisations (along with Trade Unions) may have an interest in the enactment of more favorable labour market regulation, managers in innovating companies may consider such moves to be detrimental to their organisations' commercial health: increased regulation is commonly perceived to increase costs and to reduce access to resources for innovation.

Professional Organisations and Associations:

118. Many service organisations are populated by a high proportion of professional personnel (i.e., workers with considerable autonomy, authority, and domain specific knowledge) and practitioners are commonly organised via professional associations or membership organisations. Indeed there is a trend towards greater professionalism in many services, particularly those that are identified as KIBS. The aim of establishing a more professional framework in a service sector is to aid clients faced with the difficulty of evaluating service quality in advance of purchase, by specifying what services are provided, how and at what cost. Professional associations allow service firms: to benefit from a collective voice; the opportunity to articulate their viewpoints on particular topics; to participate in standardisation processes; and to develop quality standards and quality control mechanisms. Stimulating the creation of such fora is an appropriate target for policy.

119. However, not all professional bodies are keen on innovations. Some have erected barriers to innovation as their members have sought to maintain status and privileges that are threatened by change. Professionalism is often used as an entry barrier and represents a

limiting factor in relation to innovation. Some professional organisations are able to prevent the incursion of 'alien' service providers and thereby limit supply in order to protect revenues for their members (e.g., pharmacy services and other retailers). Whilst the distinction between legitimate market regulation and interference with market mechanisms is somewhat blurred, the activities of powerful professional bodies are often tolerated or accommodated within national political systems.

Absorptive Capacities of Markets

Market Reluctance:

120. The diffusion of innovations is often retarded by the reluctance of target clients to accept a new offering; this is especially true in relation to consultancy, training, quality improvement and PR services. Potential clients may either fail to see the value of a new service, believe that it can be provided more cheaply and efficiently in-house, or fear the potential for contingent organisational changes. The value of a service often becomes apparent only after purchase and many clients are unable to anticipate benefits (a situation that constitutes a specific obstacle to co-innovation and development).

121. Psycho-social factors constitute an impediment to the penetration of service innovations. This is associated with: an innate conservatism; a perceived lack of resources devoted to innovation; and inadequate complementary (technical or business) competencies (i.e., absorptive capacity) amongst clients. Further, a lack of willingness to become engaged in the implementation of an innovative service (when intensive interaction is often required) can undermine efforts to promote a new offering. Such impediments can be compounded by protracted or delayed delivery (potential value is lost or competitor products may be sought) or by an absence of technological competencies in client firms (this is true especially where the delivery of a service requires the installation of modification of complex ICT systems).

122. The absorptive capacity of users and markets can also be affected by macro economic conditions and it is not uncommon to identify a degree of 'innovation abstinence' during recessions. As the appetite for both the production and consumption of innovations is dimmed by difficult financial circumstances, economic modernisation is slowed and innovative capabilities are eroded within producer firms. In a development that may aggravate this situation, potential clients often lose the habit of investing in new services and also the competencies that facilitate future co-innovative activity.

Cultural Factors:

123. The importation of new ideas and services from different countries and industrial sectors is frequently problematic. Managers may demonstrate an inability to adapt to new business processes or methodologies and resist (often successfully) their imposition. This may be true especially in relation to business development services and commonly affects the providers of marketing, communications, PR, design and HRM services. Conservatism is experienced frequently in relation to new software and marketing concepts and efforts to promote services functions in manufacturing organisations are sometimes met with a 'product mentality'. Managers display an inability to recognise the value of innovative services and fail to see how these might fit with or enhance extant processes. Moreover, many companies are not prepared to pay for expensive, high-quality services, especially where the value of these is neither obvious nor readily demonstrable. The providers of such services must be in a position to assess the needs of their 'customer's customers' and position their offerings with due regard to the more distant markets of their clients.

Management of Innovation, Skills and Qualifications

124. The co-ordination and administration of innovation processes requires skills that can be very different from those deployed commonly in routine business. Those planning for services-oriented innovation need capabilities in:

- Locating and selecting relevant information (e.g. on market dynamics and technological opportunities), which can be a time-consuming and specialised activity.
- Cost modelling and project management (especially where projects are long-term and conducted in unfamiliar territories), requiring procedures different from those applied to 'normal' operations.
- Networking for co-operative development of service innovations, which is a common feature of such innovations, but may involve new partners and processes (relationship-building and communications skills are crucial).
- Entrepreneurial and intrapreneurial attitudes and skills are key factors in successful outcomes (with 'product champions' being central to this success).
- Many services feature a lack of experience in the management of innovation due to their not having been heavily engaged with technological innovation until recently. Combined with significant knowledge gaps (in relation to service improvement, sources of capital and reliable advice), and lack of articulation into wider innovation systems, this may constitute a

major barrier to innovation. Such gaps are especially common in smaller and medium sized firms, where reduced access to resources is compounded by lower levels of expertise in relation to innovation management).

125. Internal barriers to innovation are another area of concern, though this may be familiar in all sectors of the economy. Interdepartmental jealousies, protectionism or traditionalism can impede the innovative efforts of specific business units. Rival business units within an organisation may be competing for central resources and perceive their bargaining position threatened by the ambitions and plans of others.

126. Compounding difficulties in the management of innovation, many firms report that their staff-base is sometimes inappropriately qualified for the progression of innovative projects (or that they are unable to locate suitably skilled staff in the labour market). Perhaps the two key components in the management of innovation relate to the availability of appropriate (human) resources and suitably trained staff.

127. Services innovation typically involves mobilising human intellectual resources. Employees are more deeply involved in the provision and delivery of the outputs, and in the innovation process, where they often relate intimately with clients. The knowledge and skills of employees are of crucial importance to the competitiveness of the enterprise. Service workers often fuse knowledge of service techniques with client requirements, and this is where much innovation is generated. Consequently, the need for a well-educated workforce is fundamental, and policies need to take this into account. The comments of some industrialists and major recruiters may be apposite here – whilst many entrants (especially graduates) demonstrate strong domain knowledge, their 'business awareness' and communications/interactional skills are frequently less-well developed. Given the intensity of the service relationship/encounter, such a lacuna may constitute a source of difficulty.

128. Adequate and ongoing training should enable service personnel to work better with innovations, and it could also help the staff of service firms be more proactive with respect to innovation. Firms should be encouraged to train their workers to take full advantage of new technologies and to accept and stimulate innovation more generally. One of the reasons cited for *not* training staff is the danger of competitors' 'free riding' and poaching behaviour, recruiting workers who others have invested in training. This may reduce the number of enterprises engaging in training, and/or change the nature of that training (for example, making it more basic, or more company-specific and less generic). If this found to be a significant problem, then incentives for training – perhaps through training subsidies, or through the

provision of tax breaks – might be increased (TASC, 1998). Alternatively or additionally, public sector organisations could be encouraged to play more active roles in industrial training (and to stimulate uptake of training where demand seems to be low, for example by charging low or zero fees to the trainees). However, the question arises of how far training agencies, and associated parts of further and higher education, display a manufacturing bias such that their courses do not sufficiently feature services innovation. It would be worth examining course provision to ensure that the particular mixes of organisational, interpersonal and technical skills - and entrepreneurial attitudes - required by services, and KIBS in particular, are adequately generated.

129. In addition, there may be an issue of 'training bias' – it is notable that in many organisations, 'development' can be perceived/deployed as a 'perk' and is commonly offered to relatively privileged and senior staff (i.e., middle-aged, middle-class, white males). The failure to develop less senior personnel – in addition to undermining morale – can result in a sub-optimal exploitation of staff potential. This is salient particularly in the services industries where innovation tends to be a process that involves or is triggered by staff at many levels within the organization. Where staff believe themselves to be valued - and are trained and encouraged to adopt an entrepreneurial perspective - their recognition and reporting of opportunities for innovative activity is likely to be improved.

APPENDIX 2 BARRIERS IN CONTEXT

Introduction

130. This appendix provides data obtained from CIS2 relating to (a) barriers to innovation which affect service firms, and (b) sources of information for innovating service firms.

Experience of Impediments to Innovation in Europe

131. The literature points to a large number of barriers to innovation; recently survey data provide some indications of their incidence and intensity – though only for those firms already identified as innovators. From the European-wide (CIS2) data, on services, we see that a number of key barriers have been identified in relation to service innovation. This allows us to elaborate on the material presented in the main text.

132. Tables A2.1 and A2.2 provide detailed information from CIS2 of the "factors hindering innovation" between 1994 and 1996 for service firms across the EU. Utilities are also included, but unfortunately at this point we cannot make a direct comparison with manufacturing data, which are reported in other sources.

133. There were considerable differences across both countries and sectors in terms of the incidence and main forms of difficulties. Thus among utilities, the share of innovating enterprises reporting difficulties with innovation activities varied from just 4% of the innovating German enterprises to 94% of the French. In this sector, in most countries, around half the innovators had experienced difficulties with innovation. (This proportion was smaller for the UK and Portugal and of course Germany). In Wholesale, around two fifths of the innovators reported difficulties with their innovation activities. This proportion was higher amongst Danish, German and Swedish wholesalers, and lower amongst wholesalers in Ireland, Luxembourg and the UK.

134. In Transport, just under a third of the innovating enterprises reported difficulties – ranging from 23% of the innovating Irish enterprises and 25% of the British, to 60% of the Finnish and 63% of the French. In Financial Services, 40% of innovators reported difficulties with innovation – ranging from just 18% of the Austrian and 23% of the UK enterprises, to 72% of the Danish and 82% of the Finnish enterprises. Almost two thirds of the innovating computer service enterprises reported being hampered in their innovation activities – a far higher proportion than in the other service sectors examined in CIS2. Again there was a range of

experience - in Ireland and Luxembourg less than half of the innovators reported difficulties, compared with three quarters in France and Denmark. For 'Technical Services', a high proportion also reported difficulties (just under half of innovators in most countries), with particularly high levels in Germany (75%) and France (76%), and low levels in Luxembourg (19%). Finally, the sample of Telecommunications firms is too small for cross-national comparisons, but again a large proportion of the innovators reported difficulties with their innovation projects, ranging from 40% of small companies, through 80% of medium and 70% of large enterprises.

Table A 2.1 European Service Firms facing Difficulties in Innovation (%)

Data are percentages of innovating firms reporting some degree of difficulty.

	AU	B	D	DK	F	FIN	IRL	L	NL	NOR	P	S	UK	ALL
Utilities	*59*	*-*	*4*	*-*	*94*	*56*	*-*	*-*	*49*	*40*	*22*	*47*	*26*	*19*
Wholesale	*35*	*38*	*49*	*58*	*-*	*39*	*25*	*21*	*43*	*38*	*28*	*47*	*27*	*40*
Transport	*36*	*28*	*26*	*26*	*63*	*60*	*23*	*52*	*30*	*45*	*37*	*37*	*25*	*30*
Financial Services	*18*	*44*	*50*	*72*	*34*	*82*	*28*	*61*	*44*	*38*	*34*	*57*	*23*	*40*
Computer Services	*50*	*53*	*71*	*75*	*74*	*45*	*25*	*25*	*57*	*60*	*52*	*61*	*56*	*64*
Technical Services	*62*	*44*	*75*	*41*	*76*	*46*	*24*	*19*	*45*	*48*	*46*	*45*	*47*	*70*
Telecomms	(Small) *42*				(Medium) *78*					(Large) *70*				*63*

Table A2.2 Factors Hampering Innovation in European Service Firms (%)

	Cases with more than 20% reporting the problem (>30% *italicised*; >40% **bold**)						
Problems:	**Utilities**	**Wholesale**	**Transport**	**Financial**	**Computer**	**Technical**	**Tele-comms**
Excessive economic risk	*Fin 37%* **Nl 40%** Por 22% *Sw 39%*	B 20% D 23% Dk 27% Nl 22%	Au 28% *F 37%* L 21% Nor 24%		D 29% Dk 40 *F 31%* Fin 28% NL 25% Nor 24% Sw 22%	**D 40%** Dk 31% *F 39%* *Nl 31%* *Nor 30%* Por 22% Sw 21% UK 22%	Small 27% **Medium 48%.** **Large 63%**
Excessive Innovation costs	Por 22% Sw 22%	Dk 27% Fin 20% Nl 20%	Au 29% B 20% *F 37%* Fin 20% Por 23%	B 21% Dk 27% *Fin 31%* L 25%	**B 46%** **Dk 42** *F 35%* Nl 23% Nor 22% Por 27% Sw 21%	*Au 37%* Dk 29% **F 52%** Fin 25% Nl 24% *Nor 30%* *Por 31%* Sw 28% Uk 23%	*Medium 32%.* *Large 37%*
Lack of sources of finance	Fin 24% **F 46%** Sw 20%	D 27% UK 20%	Au 28% D 21% F 24% Por 21%		B 45% D 26% Dk 40% F 32% Fin 21% Por 25% Sw 21% UK 35%	Au 58% B22% D52% F 27% Fin 21% Nl 22% Nor 20% Por 37% UK 31%	Medium 24%. Large 29%
Organisat-ional rigidities	*Au 31%* Fin 24% **F 43%** Por 22%	Au 23% *D 30%* Dk 23% Fin 22%	Au 29% B 20% *Fin 34%* *Nor 31%*	B 25% *D 34%* **Fin 44%** *Nor 31%*	*Au 36%* *B 30%* **D 49%** *Nor 31%*	**D 43%** Nl 20% Nor 24%	*Medium 32%.* Large 29%

continued

Table A2.2 (continued)

Lack of qualified personnel	Fin 24% Nl 23% Por 22%	D 27% Dk 21% Nl 23% Nor 25% Sw 21%	*Au 34%* B 22% Dk 22% F 22% Fin 27% Nor 26%	D26% Dk 28% **Fin 58%** Nl 21% Sw 27%	**Au 45%** **B 47%** *D 37%* *Dk 32%* *F 35%* *Fin 31%* **Nl 40%** *Nor 39%* *Sw 32%* *UK 35%*	B 29% D27% Dk 22% F 28% Fin 25% Nl 28% Nor 29% *Sw 34%*	Small 21% **Medium 44%.** *Large 34%*
Lack of technical information		Dk 23% Nl 21% Nor 24% *Sw 30%*	B 21% Dk 22%	Dk 25% Nl 23%	*Au 34%* D 20% F 24%	Fin 24%	
Lack of market information	**Fin 43%** **F 46%** Nl 28%		B 23% Dk 22%		Nl 24%	D 24% Nl 25%	
Standards / regulations	**F 49%**		Au 28% F 22%		D 22%	D 22%	
Lack of customer responsive -ness	**F 43%**	Dk 20%	Au 28% B 20% F 23%		F 29%	Dk 20% F 20% Fin 25% UK 20%	Small 21% *Medium 32%.* Large 26%

135. To some extent these data are telling us about variations in the detailed composition of the different services sectors from country to country; differences that have yet to receive sufficiently detailed analysis in the research literature. The same will be true for the following discussion of the particular factors that are at play. Nonetheless, some general points will emerge quite clearly, and it is immediately striking that the likelihood of encountering problems appears higher for the more technology-oriented services.

136. The individual factors hampering innovation also varied widely between countries and sectors. Commonly cited factors were: organisational rigidities of the enterprises themselves, the excessive economic risk of innovation, excessive innovation costs, lack of qualified personnel, and lack of market information. These make for a mixture of internal and external barriers. For Wholesale, the most widely cited factors hampering innovation efforts were: organisational rigidities, lack of qualified personnel, lack of sources of finance, and excessive economic risks. Organisational rigidities were not recognised as an issue in Portugal, whereas 30% of German wholesalers identified it. A lack of qualified personnel was an important factor in Germany, Sweden, the Netherlands and Norway. Meanwhile, wholesalers in Germany face problems in gaining finance; in Denmark, difficulties with excessive innovation costs and lack of customer responsiveness to innovation (20%) (it is speculated that this may indicate that Danish enterprises are particularly ambitious in their innovative activities). In Transport Services, a wide range of difficulties were identified, most commonly lack of sources of finance for innovation, followed by the perceived economic risk of innovation, and (particularly important in this sector) regulations or standards. Customer responsiveness makes an entrance into the list of common issues here. Financial Services widely cited organisational rigidities and a lack of qualified personnel as issues. Computer Services also faced the problem of a lack of qualified personnel, and also a lack of sources of finance and organisational rigidities. (Organisational rigidities were reported by almost half the German innovators, and a lack of sources of finance by more than 40% of both the Belgian and Danish innovators.) Technical Services confronted a lack of sources of finance (especially widely cited in Germany and Austria), and excessive economic risks and organisational rigidities were also often cited. Finally, Telecommunications Services reported a varied set of difficulties, without any great consensus. Most widely reported were such difficulties as economic risks; excessive costs; organisational rigidities; lack of qualified personnel; and lack of customer responsiveness to innovation. These are easy factors to relate to the telecommunications industry – where it is noteworthy that standards and regulations were rarely seen as having hampered their innovation activities.

137. The picture is evidently complicated, and the data should not be over-interpreted. The sampling strategy adopted (only self-declared innovators are covered, and this may not be an identical group from country to country), the meanings of the items, and the composition of the subsectors in terms of size, market orientation, etc., may all vary from country to country. However, a few comments can be made. First, organisational rigidities and lack of qualified personnel are extremely common problems, and appear to be more likely to be cited in Northern Europe (Germanic and Nordic countries). They are problems in almost all sectors except transport services. Sources of finance for innovation are a problem in many services (not financial services though!) and are often cited in the UK, France, Portugal, and Germany. 'Innovation costs' (often accompanying problems with sources of finance) is reported commonly, alongside excessive risks (which it also often accompanies). Combinations of Risks, Costs and Finance problems are very common.

138. In further analyses (Tether et al., 2000), 'high intensity innovators', i.e. those with a higher share of their resources devoted to innovation, were *more* likely to complain of encountering difficulties with innovation. Thus, the more innovative effort is being made, the more complaints about difficulties are voiced. The most frequent problems reported by the high intensity innovators were familiar ones - lack of qualified personnel, and organisational rigidities, followed by the cost of finance for, and the high perceived economic risk of, innovation. The direct cost of innovation was the most widely cited hampering factor amongst the low innovation intensity enterprises, though overall quite similar issues were raised by low and medium intensity innovators. (N.B. French data were omitted from this stage of the analysis as a result of problems relating to the key indicator).

139. The CIS2 data provide helpful insights into the incidence and intensity of problems *experienced by innovators.* What we do not know is whether non-innovators are facing exactly the same set of problems, though this seems likely. For policy purposes, what seems most outstanding is the emphasis placed on such topics as finance, organisational rigidities, and lack of skills; and the rather low weight that factors such as regulations received.

Sources of Information for Innovation

140. The CIS2 survey asked firms to rank the significance of ten sources of innovation for their innovation activities from 0 – 'not relevant' to 3 – 'very important'. This is interesting data for

the light it can shed on informational barriers to innovation, and how firms overcome these in practice. Table A2.3 and A2.4 summarise results.

141. Though only half the innovating service firms conducted R&D, over 90% recognised *sources within the firm* to be relevant sources of information for innovation (half as 'very important' sources of information). Sources of information within the firms other than R&D were highly significant for their innovation efforts: internal sources of information (and knowledge) are the central resource for service sector innovations. The literature suggests that much of this relates to professional experience of staff in contact with clients and through their personal involvement in professional associations.

142. Among external sources **customers/clients** are most prominent. They are cited as very *important* by more than 50% of firms in Austria, Ireland, Luxembourg, Norway, Sweden and the UK – but only by 28% of firms in Germany, 27% France, and 12% in the Netherlands! Over 70% of large firms in Ireland and Sweden regard them as very important. **Competitors** are also often seen as very important, again with dissention from Netherlands firms (only 4%; with Finland at 7% and France at 9%) as compared to 28% of Danish firms, and more than 20% of those in Ireland, Luxembourg, Norway and the UK. Professional meetings, fairs and exhibitions and suppliers were all widely recognised as relevant sources of information for innovation – each of these being recognised by 70% or more of the innovating firms. More than half the firms cited **consultants** as a relevant source of information for innovation. Large firms are much more likely to cite them as *very important*; consultants ranked second equal with competitors amongst the external sources of information for large firms in terms of the proportion identifying them as very important. Consultants appear to be particularly significant as a source of information for innovation amongst large firms in Belgium, Germany, France and Portugal. **Computer networks** and consultants were both recognised as relevant by about 60% of the innovating firms, but as very important by only 11%. Notably, computer networks were widely regarded as a very important source of information amongst two thirds of the large service firms in Ireland.

Table A2.3 Relevant Sources of Information for Innovation – Proportion of firms scoring Items 1 and above, for All and Large Enterprises (%)

		A	B	D	DK	F	FIN	IRL	L	NL	NOR	P	S	UK	ALL
Within the Enterprise	All	94	89	95	94	80	100	89	88	92	93	82	94	84	91
	Large	100	99	97	100	94	100	98	100	98	98	83	95	98	97
Competitors	All	94	81	85	85	55	90	87	52	63	87	64	84	84	82
	Large	90	93	83	94	71	100	98	85	77	87	89	93	88	83
Clients and Customers	All	98	90	77	99	72	98	97	74	73	91	75	91	88	81
	Large	92	92	74	94	83	97	98	100	78	89	76	93	94	80
Professional Meetings	All	86	76	83	55	60	80	86	65	70	82	70	66	75	78
	Large	90	90	91	83	66	92	98	94	84	91	93	73	89	87
Fairs and Exhibitions	All	78	71	83	68	51	76	80	51	62	73	75	79	74	77
	Large	76	64	80	75	51	72	96	55	63	75	72	77	71	73
Suppliers	All	61	77	66	81	72	86	90	78	68	83	83	84	83	72
	Large	56	91	66	88	71	81	92	85	67	95	95	88	97	73
Computer Networks	All	77	71	64	56	55	73	75	45	33	75	48	71	59	61
	Large	79	76	76	79	49	89	94	72	46	90	59	72	81	72
Consultants	All	54	56	66	49	26	65	71	42	36	68	48	63	58	59
	Large	84	86	86	78	54	80	96	78	56	89	93	84	88	80
Universities & HEIs	All	40	34	51	43	22	58	42	26	22	55	27	54	35	43
	Large	56	65	76	69	21	70	37	32	44	71	40	66	59	63
Research Institutes	All	30	24	37	33	14	43	37	21	25	51	27	n.a.	46	36
	Large	37	49	50	62	13	45	28	18	44	62	31	n.a.	57	45
Patents	All	26	15	31	28	11	29	19	3	11	23	9	28	19	25
	Large	23	29	36	41	4	26	18	0	14	29	5	31	22	28

Table A2.4 Very Important Sources of Information (score 3) - All and Large Enterprises (%)

Adjusted		A	B	D	DK	F	FIN	IRL	L	NL	NOR	P	S	UK	ALL
Within the	All	30	42	59	37	49	48	49	71	42	64	40	56	38	51
Enterprise	Large	29	49	70	27	59	33	35	95	52	48	56	67	39	60
Clients or	All	61	48	28	48	27	43	56	50	12	55	34	57	65	38
Customers	Large	57	48	26	42	31	58	73	41	19	44	32	74	50	33
	All	18	14	21	28	9	7	21	23	4	20	19	15	20	19
Competitors	Large	17	37	25	10	23	15	17	47	6	19	24	27	19	22
	All	3	22	16	28	23	10	28	41	10	23	26	22	27	19
Suppliers	Large	0	20	8	21	19	14	61	37	10	26	16	18	22	13
Fairs and	All	15	9	20	10	5	2	19	19	5	10	26	6	17	17
Exhibitions	Large	2	8	12	2	4	0	2	5	4	3	8	3	3	9
Professional	All	7	14	22	5	8	3	11	20	6	11	19	4	8	15
Meetings	Large	6	8	16	6	8	0	8	27	7	13	7	4	8	12
	All	1	11	13	10	6	2	14	10	2	9	16	8	10	11
Consultants	Large	8	20	28	14	24	3	6	10	5	13	31	2	12	22
Computer	All	11	11	13	12	8	7	20	16	3	14	15	10	9	11
Networks	Large	8	14	9	17	5	11	65	18	3	11	6	12	9	9
Universities	All	1	2	6	0	2	3	6	8	1	5	5	5	4	4
& HEIs	Large	1	8	6	2	3	0	2	0	3	2	6	6	4	5
Research	All	1	3	3	1	2	1	2	4	3	2	3	n.a.	7	3
Institutes	Large	4	8	2	5	1	0	6	0	3	2	5	n.a.	3	2
	All	2	1	1	0	1	0	0	0	1	0	2	0	0	1
Patents	Large	1	2	1	0	1	0	2	0	1	0	0	1	1	1

143. Universities, (government and private) research institutes and especially patents were each recognised as being even marginally relevant sources of information for innovation by less than half the firms. (In the case of patents, which service firms rarely utilise, this was only a quarter of the firms.) Each of these sources was more widely recognised as relevant by large firms. Even large firms did not consider these sources to be very important for information related to innovation (less than 5% – in the case of patents 1%). There are striking national differences again. For example, over half the German, Finnish, Norwegian and Swedish firms saw Universities as relevant (though rarely very important), as compared to less than a quarter in France and the Netherlands; over half the Norwegian firms mentioned research institutes, as compared to less than a quarter in Belgium, France, and Luxembourg).