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Services: Invisible Innovators

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ABSTRACT

This paper argues that services play a variety of important roles in the innovation processes in advanced countries. Though this is beginning to be recognised, we still have inadequate tools for assessing the contribution which they make, and there is limited appreciation of the diversity of experiences. The paper reviews a number of approaches to the topic, and concludes that while some services are highly innovative, others remain laggards. A variety of factors play a role in this, and while it is difficult to reach definitive conclusions, it appears that the client-intensity of services is a major element. Current developments make it likely that service innovation will become more visible, in particular in relation to the use of IT (Information technology). In contrast, manufacturing innovation will become less visible than previously, reflecting the growing role of intangibles in economic life.

Services Everywhere

The term “services” is ambiguous, being applied to firms, industries, commodities, and activities. Service products or commodities - such as after-sales, marketing, maintenance, etc. - may be generated and delivered (sold or free of charge) by firms in any sector, manufacturing included. In the sense of occupations services - such as white-collar and other “non-production” jobs like security, catering, cleaning - may also be found in all sectors. The white-collar share of industrial workforces, and the services share of manufacturing firms’ outputs are generally growing. This essay will focus on **service sectors and firms**. Important factors in the evolution of such firms and sectors involve the relocation of service activities and occupations within specialised producers.

There is a substantial tradition of defining services in terms of what they are not - documenting ways in which they differ from manufactures. (This even appears in the joke definition that services can be bought and sold, but cannot be dropped on your foot). The typical service, then, is often characterised in terms of qualities that appear to be “peculiar” as viewed from the supposed norm of manufacturing. The service **product** is often intangible, hard to store and/or transport, and difficult to demonstrate in advance to potential clients; In terms of its **production** many service firms are of small size, low technology-intensity, and employ relatively unskilled staff; **delivery** is important, with a high degree of client-supplier interaction and with consumption and production often being coterminous; **regulatory** issues loom large, and many services are either run by the government or highly dependent upon state funding of a more indirect kind., and so on. Many exceptions can, of course, be found to such generalisations; quite possibly they are becoming more common. We will return to these later, but first we should stress the variety of things that are counted as services.

“Service industries” comprise a multitude of different sectors and firms. But familiar distinctions between the primary, secondary and tertiary sectors also lead to these activities being defined in negative terms, as **not** making, growing, or mining things. A more positive approach, based on the work of pioneering analysts such as Terence P Hill and Dorothy Riddleⁱ, relates economic sectors to their specific types of transformative tasks. The **primary sector** is mainly concerned with extracting raw materials from the environment; and the **secondary sector** with transforming these raw materials into material goods and other artefacts. What then of the **tertiary sector**?

Several distinct kinds of transformation of the state of organisms and artifacts encompassing generic activities like movement and storage, maintenance and revitalisation, elaboration and intensification, are suggested:

- affecting the *state of the environment* - as in waste management, pollution clean-up, park-keeping;
- affecting the *state of the artefacts* produced by other sectors - e.g. repair and maintenance, goods transport, building services, wholesale and retail trade;

- affecting the *state of people* - as in health and education services, hospitality and consumer services such as hairdressing, public transport;
- affecting the *state of symbols (data, information, knowledge)* - entertainment services; communication services such as broadcasting and telecommunications; professional services and consultancies.

Despite this diversity, the treatment of services by analysts of economic and technological change has been very one-dimensional until recently. Their roles in technological change, in particular, were largely seen as so insubstantial as to be barely worth examination. They were, and still generally are, assumed to be innovative laggards - "supplier-driven" industries. A very few services were always recognised as exceptions to this rule by the relatively few researchers who have examined the services economy - but there were efforts to deal with these anomalies in some of the classic studies by defining technology-intensive services such as telecommunications and airports out of the sector.

Services and Innovation

It is now apparent that many services are becoming more technology-intensive. Some service sectors account for the lion's share of IT investment, contrary to the view that services are in general laggards in the use of new technology. They are the dominant users of new IT, with over three-quarters of the investment in IT hardware in the UK and US, stemming from services.ⁱⁱ Though branches like financial services are highly advanced in IT use, others are indeed lagging - e.g. corner-shop retailers, small taxi firms, undertakers. Continuing developments in IT - more user-friendly PCs and mobile communications in particular - is likely to lead to even more uptake in such services.ⁱⁱⁱ

Beyond simply *applying* IT in the form that manufacturers supply it, many IT-using services *develop it* in innovative ways. Many IT professionals - e.g. systems analysts, electronic and telecommunications engineers - are employed in services^{iv} and are installing and maintaining systems provided from outside. But some of the time they are generating new configurations for, and applications of, this advanced technology. They are automating their firms' established practices, and providing the basis for more dramatic product and process innovation using the new technology.

New technology is being applied to render services more prominent in international trade and investment. Services innovation is closely linked to the increasing tradability of services, and may become a key factor in national competitiveness and the balance of payments. This topic, too, has only recently received much attention.^v Services are often only partly visible in trade statistics. This mirrors a wider invisibility. In the innovation field, the traditional relative lack of attention to data on services is compounded by unusual features of innovation in services, ranging from different types of innovative output (e.g. very few patents emanate from most service sectors - though this may change with the growth of specialised laboratory and R&D services) , to different patterns of organisation for innovation.

Services and R&D

As services' role in technology production has begun to be recognised, attention has turned to measuring their technology efforts. Previously these were considered to be so minimal that it was not worth the effort of examining them. Just a few years ago, a review of the problems noted that:

“official R&D statistics capture well under half (about 34-45 per cent) of the total efforts devoted to technological advance...official R&D statistics especially underestimate the actual technological effort in such areas as production engineering, software and design, in small firms and in service sectors...the underestimation of actual industrial technological efforts...has increased with the growth of service activities and the increasing importance of research activities in such areas as software development.”^{vi}

Some countries' official R&D data still explicitly exclude services, Japan being one. But in others, efforts have been made recently to capture R&D activity by services.^{vii} The results demonstrate that innovation is no prerogative of manufacturing. Thus, current US estimates indicate that nearly a quarter of business R&D is performed by nonmanufacturing firms - as opposed to 3.2% in 1977 and 8% in 1987. The figure for Britain, like that for the USA, has also mushroomed from almost nowhere to a quarter of the total.^{viii} It is unclear how much of this change cases represents underlying trends as opposed to modifications in statistical approaches. Several countries have higher proportions of business R&D in services firms - e.g. Canada passed the 30% mark in 1994,^{ix} and there are higher proportions still.

Yet even figures like 25, 30 even 40% are well below the equivalent figures for services' economies' employment and output. Part of the problem here is that the measurement of R&D in these statistics is inadequate. The Frascati Manual,^x which supplies the standard definition of R&D, only included software in its most recent revision, for instance. Service firms often do not recognise themselves or their activities in these enquiries. They do not see themselves as “industrial firms”, nor their innovative activities as R&D or technological development (rather than, say, “applications development”).^{xi} Service firms are relatively much less likely to establish R&D departments. Instead they more often undertake technical development on a project-specific basis, and often do not even define this as R&D.^{xii} So new instruments for measuring innovative effort may be required.

Of course, there has been much work on developing such measures - the Oslo Manual now accompanies the Frascati Manual. Several recent studies using such instruments still support the view that many (by no means all) service firms put *less* effort into technological innovation than might be expected.

More definitive results may be provided by the wave of newer studies; the European CIS (Community Innovation Survey) and parallel studies in several other countries are giving systematic data on a much wider scale than heretofore. The evidence to date still does suggest that many service firms actually are innovative laggards. Even

among those who are active innovators, there may not always be the level of innovation one might expect by comparison with manufacturing. Again their may be measurement problems, with the first round of CIS questions still deterring service respondents. But it increasingly looks as if there is a real deficit among some services. For instance, a recent Australian survey with a very broad attitude to what constitutes innovation found substantially lower levels of “product” and “combined” innovation in services, though there were high levels of “process” innovation.^{xiii}

Sources of Innovation

There is a long tradition of viewing services as essentially supplier-driven, whose impetus for use of new technologies comes from the manufacturing sector. This has never been strictly true - consider telecommunications, rail transport, etc. - but in the 1980s a new line of analysis - the “reverse product cycle”^{xiv} - was introduced. This suggested that IT in particular represents a change for services, being a technology that many of them can utilise, and which facilitates their becoming innovative. The major element of information-processing in their activities has meant that until recently many services could not apply much technology to core processes (services that deal with more complex human problems may still find it difficult to apply automation to these core activities).

The “reverse product cycle” argument goes that many IT-using services are moving from applying IT to their established practices, to undertaking much more dramatic product and process innovation using the new technology. Thus, many of the IT professionals being employed by services are not simply installing and maintaining systems provided from outside, but are actively generating new applications and configurations for this advanced technology.

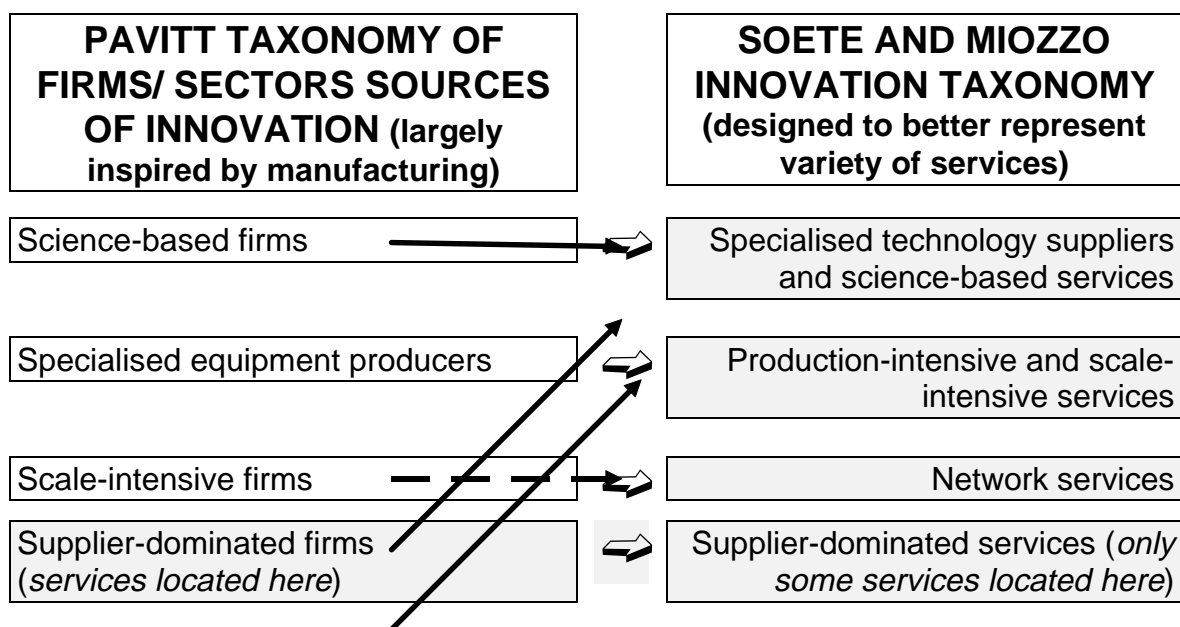
This account is persuasive, and may well apply to many sectors which have high information-processing requirements while not previously having great concern with technology. But it is by no means the only factor bringing services to the fore in innovation. Far from all being supply-driven, as was assumed by early taxonomies of innovation,^{xv} the range of innovative practices in services is as wide as that in manufacturing. Soete and Miozzo^{xvi} argue for a differentiated view of the production and use of innovations within services. They distinguish three categories of service businesses (Figure 1):

- I. **Supplier dominated sectors** e.g. public or collective services (education, health care, administration), and personal services (food & drink, repair businesses, hairdressers, etc.), together with the retail trade^{xvii}.
- II. **(a) Production-intensive scale-intensive sectors:** involve large scale back-office administrative tasks. These services in particular are suited to the application of IT, initially, at least, with the aim of reducing costs. **(b) network sectors:** dependent on physical networks (e.g. transport and travel services, and wholesale trade and distribution); on elaborate information networks (e.g. banks, insurance, broadcasting and telecommunication services). Public utilities, such as water and gas supply, may also be located in this group of

firms, though these are not usually taken to be service sectors. Such services play a major role in defining and specifying innovations. Thus the suppliers of new technologies are to some extent “service dependent” (p.16).

- III. **Specialised technology suppliers and science-based sectors:** e.g. software and specialised business services, laboratory and design services.^{xviii} The main source of technology is the innovative activity of the services themselves. The innovations tend to be “user dominated”.

Figure 1 Changing Views of Services' Innovation



Source: suggested by the discussion in Luc Soete & Marcela Miozzo Trade and Development in Services: a technological perspective. Working Paper No. 89-031. Maastricht, MERIT, 1989

The Soete and Miozzo approach reminds us that the role of services is generally neglected in accounts of national innovation systems (with obvious exceptions in training and academic research and higher education). It also draws our attention to specialised suppliers of technology intensive services. These latter activities are part of the notable expansion of producer services in industrial economies. Some of these are relatively low skill services (such as catering, cleaning and security, typically characterised by 'flexible employment patterns', and often part-time or temporary work. Other activities contain much higher proportions of skilled workers, and of particular interest to the study of innovation. The growth of **Knowledge-Intensive Business Services** (KIBS) reflects increased demands for technical and administrative knowledge in the economy, together with trends in the division of labour which lead to specialised services emerging and playing prominent roles in

knowledge accumulation and transfer. Some are traditional professional services like legal and accountancy, marketing and counselling. Others deal with technological challenges. IT, as a generic technology, is obviously particularly important; new services surround other critical technologies, and a notable area of growth concerns those associated with *environmental challenges* (sustainable development and “clean” technology).

The new-technology-based KIBS rely heavily upon professional knowledge. Some supply information and knowledge to their users as their central function (for example, in the form of measurements, reports, training, consultancy). Some use their knowledge to produce intermediate inputs to their clients' own knowledge generating and information processing activities (e.g. communication and computer services). Some use their specialised knowledge to provide other technical functions, such as pollution detection and remediation services. Many firms combine a mixture of such activities. Some KIBS are highly standardised; their service products are largely supplied as packaged commodities). Most supply products which are highly customised to clients, with whom there is much interaction. Their employment structures are heavily weighted towards scientists, engineers, and other experts.

One trajectory for much services' innovation is the move from client-intensive to commodity packages and combinations of modules; this process is apparent in KIBS like software, and is likely to grow in prominence. But continuing radical technological innovation, leading to new challenges for firms, is liable to underpin continuing demand for new client-intensive KIBS.

The growth of such KIBS has been driven in large part by **demand**. Highly technical or complex services may be too costly to undertake in-house for most firms, especially if they are novel and seen as experimental, only required occasionally, or problematic in terms of achieving a minimum efficient scale. Structural changes in industry (downsizing, concentration on core activities) have led to the externalisation of activities which were in the past provided in-house. Even activities which were usually regarded as a part of the core business, and which analysts normally assumed could not be delegated to outsiders, are being treated in this way. The contracting-out of services from public sector bodies, usually under political imperatives, has also stimulated use of certain services. Some growth of private R&D-intensive services may also relate to the process of privatisation and “marketisation” of government laboratories and similar facilities. On the **supply** side, new-technology- based services have been “spun-off” of from firms in other sectors, as their competence at supplying (especially technology-related) services has grown.^{xix} Recently, many professionals have been shed from firms that are “downsizing” and are seeking to establish themselves as self-employed service suppliers - thus a growth in one-person consultancies .

The rapid growth in demand for producer services in the 1970s and '80s has allowed for high charges to be levied, and for less attention than would be desirable to be paid to issues of quality. In many service sectors one hears complaints about "cowboys".

Given that **trust** between the parties concerned is a key factor in the establishment and success of services, a number of problems can arise. It may be hard for new firms to establish themselves in existing areas, or for new types of service altogether to arise. When it is hard to demonstrate your product (or trustworthiness) in advance, there may be a need for schemes which promote quality standards and innovation awards, and systems for the interchange of experience of use of services. Clients, too, may benefit from exchange of experience and self-help, e.g. through user groups (which can also sometimes exert pressure on service suppliers - for example, telling them to unite around a common standard). Close relationships between suppliers and clients may lead to "lock-in" or other anti-competitive practices. Other problems can arise with respect to legally or politically sensitive activities, working with firms who may be competitors, etc.

Fears about "cowboys" notwithstanding, it is clear that there are many highly innovative firms present. High levels of competition are stimulating this innovation, especially as the economic shake-out of the 1990s has led to many clients seeking to minimise costs, ensure higher performance standards - and to put many of their skilled staff onto the labour market, and thus render them possible sources of new service start-ups.

Not surprisingly, most of the innovation is continuous rather than discrete; and many of the smaller firms have real problems in developing an innovation strategy. Pursuing new ideas is often something that takes place out of office hours, and without much conscious planning or discussion among team members. AS in most other services, much innovation is highly project-based (which is not to say that the developments generated in the course of one project are not taken up in successors). But it can be hard for an outsider to distinguish the elements that are customisation from those that are genuinely technically novel, in many cases. There is rarely an R&D department, more often simply a project team. Most technology development appears to take place in-house, with frequent contracting-out of specialised activities (such as writing a specialised element of software). There is quite often collaboration with other partners - and especially with clients.

It is hard to characterise KIBS innovation as supply- or demand-driven: typically the two components are highly related. Recent case studies^{xx} suggest that "R&D" (they often resist the term) in KIBS is often largely client-led, in terms of requests for products of particular types, with a complex relationship between client inputs and the technology development activities. These client inputs most often concern the form of the final product and the way in which it is delivered, not surprisingly, rather than how it is actually being produced or what its underlying principles. In the IT world, technically sophisticated clients may require particular software and hardware platforms, however. More generally, services may be pressed by their clients to adopt quality and environmental management procedures.

Sluggish Services?

Even if they do not spontaneously categorise their activities as R&D, many service firms - especially KIBS - do engage in innovative activities. But more services currently emerge as relatively sluggish innovators. Explanations for this may lie in the “peculiar” characteristics of services, which are often shared despite the heterogeneity of the sector stressed above. Some features do apply to many services to a much greater extent than to primary or secondary sector industries, and which have contributed to the specific innovation patterns of the sector. We can almost always find prominent exceptions to any rules here. One reason for there being so many exceptions to generalisations about the nature of services is precisely that technological change - and other innovations in the organisation of services - is affecting the features which have often made innovation difficult in the past.

Beginning with aspects of the **service production process**, these features include:

- (1) **Technology and plant.** Services have often been seen as having relatively heavy investment in buildings, light in technology, though IT investment is actually now particularly intensive in certain services. It may well be that IT can be used to reduce the costs of buildings - for example, by using tele-services to reduce the number of local offices that are maintained. However, “smart buildings” are not necessarily that cheap. *Less of a history of managing technology may influence innovation processes; and IT innovation may have distinctive features (e.g. software and user-interface dependence).*
- (2) **Labour.** Some services feature exceptionally high numbers of professional staff, like doctors, lawyers, teachers - and these roles typically require interpersonal as well as domain-specific skills. Costs can be reduced by relocating key operations to areas of low labour costs (using telecommunications to maintain co-ordination), as is apparent in software outsourcing to developing countries from the USA and Europe; the need for expensive and scarce skills may be reduced through remote access to expertise (e.g. on-line medical diagnosis or assistance with advice on surgery) and, possibly, by use of expert systems and other decision aids, though these seem to have been incorporated within established professions rather than replacing them in most cases). *Professionals may be more able to resist or redirect innovations which would be aimed at deskilling or replacing them. Some other services rely much more on unskilled, and often family, casual or part-time labour. A classic explanation for services’ limited innovation lay in the lack of technical capabilities of such workers. . Low-skilled staff may be unable to learn to use new technologies appropriately without significant investment in their training and perhaps in job redesign^{xxi}. In contrast, while professionals may resist any incursion upon their autonomy, and be able to restrict the use of new technology or shape it so that it freezes the work organisation so as to benefit them, while not necessarily conferring advantages to other areas of the firm.*

(3) **Organisation of work.** Service work often takes the form of in craft-like production with much discretion for the individual employee and limited management control of the pace and quality of work; and classically information has been relayed up and down the larger service organisation through an elaborate bureaucracy. Systems which use IT are being introduced to change this. Activity may be monitored, and in 'flat' or 'delayed' organisations, data from field and front-office workers is fed directly into databases and Management Information Systems, while managers use telecommunications (even TV broadcast in some large companies) to communicate with workers. *Manufacturing industry has long examined its work organisation, and "industrialised" it: this is a newer challenge for many services - though discussion of Business Process ReEngineering suggests that all sectors have much to learn about themselves!*

(4) Other **features of production.** Service production is often non-continuous, with limited economies of scale - some services are now embarking on "mass customisation", assembling individually tailored services out of a large number of components produced in a standardised way and with consistent quality; thus 'fast-food' chains have organised the production of meals away from the traditional craft of cookery toward a more assembly-line like system with standard components and a high division of labour. The organisation of service industries ranges from small-scale family firms and self-employed people to state-run public services - the latter are undergoing major change in many countries with privatisation, competition and outsourcing forming common strategies. Another (sometimes related) approach is to introduce 'quasi-markets' into public services, and new modes of charging ('pay per' society) and new reservation systems, to increase the transparency of bureaucratic allocation systems. As for small firms, in some cases they are using network technologies to enable them to compete with larger organisations. IT-based service management systems are being used in the reorganisation of larger businesses. *Family firms may have less incentive and capability to innovate; public sector organisations may be under political constraints which sometimes restrict investment, sometimes lead them to be demonstrators for particular technologies. . Small firms and large bureaucracies face certain impediments to innovation that are less marked in medium-sized and large firms. In the case of small firms there are less resources available to put into learning the ways in which technologies may be used - and even less opportunity to learn about the different technological opportunities that may be available. In large bureaucracies, on the other hand, learning is likely to be localised, with knowledge not being transferred from specialised groups (e.g. Data Processing Centres) and with the routines in other offices being hard to shift.*

(5) Turning to the **immaterial nature of the service product** itself, many services are intangible, hard or impossible to store or transport (so consumption and production are liable to be coterminous, and either the supplier will have to move to the user or vice versa). IT allows for the electronic and optical storage and transmission of the information content of products. Telematics are often being used for ordering, reservation, and where possible - as in software and

information services - delivery of the service. Automated Teller Machines and equivalent information services allow for service delivery outside of office hours. Additionally, new material components such as client and membership cards are being introduced by services as varied as supermarkets, banks and airlines. *Immaterial elements of services require different skills in product innovation, and may be less easy to gain finance for. There are problems in justifying expenditures on technological change, since the achievements of innovation may be hard to quantify when the products are immaterial.*^{xxii}

- (6) **Customisation of Product.** Many services are 'client-intensive', meaning that they requiring inputs from consumer into the design and production process - this is perhaps the single most important issue in innovation processes in services, since interchange of information about client requirements and product specifications is an interactive and quite possibly unpredictable and nonroutine process. Efforts to utilise ICT to enhance and/or routines these processes include Electronic Data Interchange as a system for remote input of orders and client details; using software to analyse client requirements and match these to the service product (or to ancillary services, as in customer support and helplines). Another line of approach is formal or informal self-service, wherein the client does some of the work of assembling the service product. *It may be necessary to get clients on board in innovation, it may be necessary to achieve a critical mass of users; some types of communication remain hard to automate.*
- (7) **Marketing Problems.** It is difficult to demonstrate many services to potential clients in advance of their actual purchase. This can be a particular problem for new entrants, who have yet to establish a reputation, and for new services in general. Among the solutions attempted to this problem are guarantees and quality standards. Demonstration packages are quite prevalent in IT services, where demonstration software or on-line access is commonly used. A sense of the capability of the product is given without its full functionality being provided, or access is provided for a trial period only (in the case of shareware under an a "honour" system.) *New services may be particularly hard to demonstrate to end-users, who will often be required to invest more time in trialling them and may not have external sources of validation such as are prominent in many goods markets.*
- (8) Finally, **regulatory issues** are often important for services. Professional regulation is a common feature of some services, service markets have frequently been sheltered from international competition, and some professional services like lawyers, accountants and now environmental services are largely dictated by regulations (which may create markets, but may well limit the scope for product innovation). "Deregulation" is a misleading description of a complex of trends more appropriately described as reregulation. In any case, the constraints and opportunities faced by services are in flux. Regulatory institutions and service providers alike may respond by demanding new performance indicators and diagnostic evidence. *Regulations may determine the form of a service - e.g. company audits - making it hard for the supplier to innovate.*

Tables 1 and 2 suggest that such a framework for classifying the “peculiarities” of services can be used, in addition to helping us think about the reasons some services are sluggish innovators, to throw light on two more issues. The first is the innovation strategies of services. Some of these, as Table 1 suggests, are actually attempts to side-step the problems which have made innovation difficult in the past. The second issue is the “convergence” of manufacturing and services, often summed up as the industrialisation of services versus the tertiarisation of manufacturing. Table 2 depicts ways in which firms in each sector can be moving away from the stereotypical characteristics of their sectors. If these trends are substantial ones, we may find service innovation being easier to measure, and manufacturing innovation being harder to - indeed, it is questionable whether established tools are capturing much of the innovation in marketing, R&D itself, and other service components of manufacturing.

Many of the “peculiar” features of services are liable to affect the innovation process, as indicated. However, certain issues are particularly prevalent in shaping services innovation - limiting it, or setting it on distinctive trajectories. In the future we can hope for systematic assessment of such issues on the basis of innovation surveys and similar instruments. At present, the picture is more of an impressionistic one based on case studies.

Organisational innovation

Organisational innovation is intimately related to technological change in many services. Services have placed much emphasis on organisational change as a competitive strategy - the development of supermarkets and hypermarkets, and of their design and layout features, for instance. This importance of organisational innovation may reflect the limited extent of technological innovation in many services until the arrival of IT. Now IT facilitates reconfiguration of organisational structures - e.g. the changing managerial and front-office functions, and “downsizing”, currently underway in banks and other financial institutions.^{xxiii}

One organisational “innovation” that might be useful for services to adopt is to give more formal management recognition to their innovative activities - e.g. entrusting a manager with responsibilities for innovation strategy, or simply finding time to reflect on knowledge acquisition in their activities. Setting up an R&D department, may also be appropriate, but there may be good reasons for the tendency of services innovation to be spearheaded by project-based teams rather than by R&D departments.

Table 1 Innovating around the “Peculiarities” of Services

“Pecularity”	Innovation Strategies
<p align="center"><u>SERVICE PRODUCTION</u></p> <ul style="list-style-type: none"> • Technology and Plant: Heavy investment in buildings. • Labour: Some highly professional (esp. requiring interpersonal skills); others relatively unskilled, often involving casual or part-time labour. • Organisation of Labour Process: Workforce often engaged in craft-like production with limited management control of details of work. • Features of Production: often non-continuous and economies of scale are limited. • Organisation of Industry: range from state-run public services to small-scale family firms and self-employed. 	<ul style="list-style-type: none"> • Reduce costs of buildings: use tele-services, toll-free phone numbers, etc. • Reduce need for expensive and scarce skills by use of expert systems and decision aids; relocate key operations to areas of low labour costs (using telecommunications to maintain co-ordination). • Use IT to monitor operations (e.g. tachometers and mobile communications for transport staff); 'flatten' or 'delayer' organisations (data from field and front-office workers directly enters databases and thence Management Information Systems). • Standardise production (e.g. 'fast-food' chains), reorganise more like assembly-line with more standard components and higher division of labour. • Externalisation and privatisation of public services; combination of small firms using network technologies; IT-based service management systems.
<p align="center"><u>SERVICE PRODUCT</u></p> <ul style="list-style-type: none"> • Nature of Product: Immaterial, often information-intensive; Hard to store or transport; Process and product hard to distinguish. • Features of Product: Often customised to consumer requirements. 	<ul style="list-style-type: none"> • Add material components (e.g. client cards, membership cards). Use telematics for ordering, reservation, and if possible - delivery. Maintain elements of familiar 'user-interfaces'. • Use Electronic Data Interchange for remote input of client details; software analysis of client requirements, matching these to service product
<p align="center"><u>SERVICE CONSUMPTION</u></p> <ul style="list-style-type: none"> • Delivery of Product: Production and consumption coterminous; client or supplier may have to move to meet each other. • Role of Consumer: Services are 'client-intensive', requiring inputs from consumer into design/ production process. • Organisation of Consumption: Often hard to separate production from consumption. Often formal or informal self-service. 	<ul style="list-style-type: none"> • Use of Telematics; Automated Teller Machines and equivalent information services. • Consumer use of standardised menus and new modes of delivering orders (EDI, fax, etc.). • Increased use of self-service, utilising existing consumer (or intermediate producer) technology - e.g. telephones, PCs - and user-friendly software interfaces.
<p align="center"><u>SERVICE MARKETS</u></p> <ul style="list-style-type: none"> • Organisation of Markets: Some services delivered via public sector bureaucratic provision. Some costs are invisibly bundled with goods (e.g. retail sector). • Regulation: Professional regulation common in some services. • Marketing: Difficult to demonstrate products in advance. 	<ul style="list-style-type: none"> • Introduction of 'quasi-markets' and/or privatisation of services. New modes of charging ('pay per' society), new reservation systems; more volatility in pricing using features of EPOS and related systems. • Quality certification, databases, performance indicators and diagnostic evidence used by regulatory institutions and service providers. • Guarantees; demonstration packages (e.g. 'demo' software, shareware, trial periods of use).

Source: based on Ian Miles, 1993, “Services in the New Industrial Economy” Futures Vol. 25 No 6 pp653-672

Table 2 Convergence between Services and Manufacturing?

FEATURES OF THE INDUSTRIES	CHANGES IN SERVICES	CHANGES IN MANUFACTURING
FEATURES OF PRODUCTION		
Technology and Plant	Increasing levels of capital equipment in new IT.	Much use of IT similar to services.
Labour	More technical labour, again like other sectors. Downsizing of white-collar staff.	Knowledge-intensive production: higher skills, both growth and downsizing of white-collar staff.
Organisation of Labour Process	Standardisation of tasks using new technologies and organisational techniques.	New forms of work organisation (inc. mobile work)
Features of Production	Economies of scale and "industrialised" production sought in many services.	Increased flexibility; reduction of stocks and inventories with "just-in-time" methods.
Organisation of Industry	Increasing prominence of large services companies, including global service companies.	"Hollow firms" focusing on core specialisms, subcontracting other activities. Also globalisation of business
FEATURES OF PRODUCT		
Nature of Product	Many new services embodied in IT media.	Shorter product life-cycles (e.g. more ranges, held in stock for shorter periods)
Features of Product	Standardised products for some services.	Flexible production allows customisation of largely standardised products.
FEATURES OF CONSUMPTION		
Delivery of Product	Use of new media for delivery (especially information services)	Closer linkages between production, design and market, using new IT systems.
Role of Consumer	Consumer may interact with IT systems, rather than staff.	In some sectors, more input into design and into R&D.
Organisation of Consumption	Use of new media to separate production and consumption.	Some leasing.
FEATURES OF MARKETS		
Organisation of Markets	Privatisation of public services.	Manufacturing companies market in-house services. State manufacturing and utility companies privatised.
Regulation	De/reregulation; GATT rules.	Environmental regulation growing. Standards.
Marketing	More marketing effort, including trade shows and demonstration efforts.	Greater market-orientation & customer service activity promoted.

Regulations

Some services' product innovation is limited because the product is satisfying a regulatory requirement - e.g. company accounts. Service firms may have to adapt to changing regulatory requirements, but have little scope to take initiatives other than in process innovation. In such cases, ambitious service firms are liable to strive to enter new (related) areas of activity; most large accountancy firms offer consultancy services drawing on their knowledge of clients and markets.

Regulations have promoted growth of activities such as environmental services, where growing regulation of businesses' environmental impacts has spurred the growth of specialised firms supplying relevant knowledge to industry. Liberalisation and "re-regulation" of such sectors as financial and telecommunications services has led to new products and market segmentation strategies.

IPR

The immaterial nature of many services can pose problems to the protection of intellectual property rights. Many services find it hard to protect innovations from copy by competitors - does this reduce the incentive to innovate? Intellectual property problems are cited much less often by service firms than one might expect. (The exception is software, where much effort has been expended in court cases over the last few years to apply copyright protection to software.) Investment in developing new product and process technologies, in order to stay ahead of the competition, is characteristic of many new technology-based services; as long as they can stay ahead, they do not much mind being imitated.

Others may have accommodated to an unfavourable IPR situation, to the extent that they do not see it as peculiar or worth complaining about. Innovative service firms do seek to safeguard their lead in knowledge - for example, by means of acquiring employees, aggressive marketing of trade marks and brand names, after-sales services (such as helplines for computer software products) customer lock-in, and the development of a service delivery system. Service companies can gain an edge over competitors by adapting trading hours, location of outlets, and distribution of services. Some consumer service companies base their competitive position specifically on the speed of their services.

Clients and Services Innovation

The design, production and/or delivery of services frequently involves the user as well as the service supplier. Many services are customised to user requirements; and there may be high elements of coproduction and self-service. The service supplier learns about client operations and requirements, and comes to better understand the market. The client learns about the service provider's routines, capabilities and technological base. The client too, may be in a position to generalise from this knowledge - to make better use of the service, and/or to explore alternative suppliers.

The products of innovative high-technology services are quite often simultaneously customised to specific clients; in the course of this there can be incremental or even radical innovation. Each product has new features unlike the combination of different toppings on pizzas to create a multitude of options within a limited range of possibilities. It may be hard to distinguish in practice between minor stylistic changes and substantial design innovations. Customisation is generally defined as not being “innovation”, but matters are more complex, especially in KIBS.

Furthermore, high levels of supplier-client interaction in many services can make it hard to say just where the innovation is taking place, and who is responsible for it. Clients and groups of clients may originate innovative ideas which services implement; in other cases, services play substantial roles in client’s internal innovation processes. Services such as consultancies and training firms act as technology transfer agents. Consultancy firms, in particular, can play important roles in the building of technological capabilities. They can help firms with selecting and implementing innovations, in training and research project management, and so on.^{xxiv}

Co-development of new services with clients is common when the clients are themselves advanced in their field and able to team up with the service provider. Many KIBS require substantial customer-specific knowledge, and are at least in part designed and provided within the facilities and working processes of the client. Strategic alliances can be part of efforts to enhance the appropriability of innovations which are hard to protect in other ways. Trust between the parties concerned is a key factor in the establishment and success of services, , though close relationships between suppliers and clients may lead to “lock-in” or other anti-competitive practices. Other problems can arise with respect to legally or politically sensitive activities, working with firms who may be competitors, etc.

Services often promote technological learning in their clients. Some training may be the strategic: clients with some relevant knowledge *may* utilise the service effectively, provide better feedback on service functionalities, be able to solve minor problems themselves, and, perhaps, gain enough understanding of the potential of the service/service firm to be drawn into paying for more inputs. Learning may occur more “spontaneously” as clients interact with service technologies. KIBS can thus influence clients’ accumulation of knowledge and help shape their technological trajectories, even without explicitly setting out to transfer knowledge. Some clients take a strategic orientation, too, using a service to explore technological possibilities, and determine lessons as to successful operation. (Several businesses used British Telecom’s Prestel as a learning platform before creating their own private videotex services.)

Product, Process and Delivery Innovations

Product and process can be hard to differentiate in many services - conventional distinctions between product or process innovation may also be problematic. Product innovation refers to the new or improved services which can be provided to clients. Accounts differ as to the relative importance of product innovation in

services - an Australian survey found them relatively infrequent, while a Dutch survey found them to be in the majority.^{xxv}

Process innovation, for many large-scale services in particular, involves their “back office” activities, which are being restructured away from their traditional craft-like nature. Many process innovations involve IT, and quality control and performance indicator systems are also being introduced into many service operations. As such systems examine the components of a service production process, they may suggest scope for reorganisation or new divisions of labour, or application of new technology. Associated with this, too, is the modularisation of service activities,^{xxvi} as distinct elements of the service bundle are separated out, and may be combined together in specific ways according to client requirements. Here process innovation does blur into product innovation. Another strategy spanning product and process, is commoditisation. Components of services for which there is a wide demand are mass produced and distributed as standardised products, rather than tailoring the service to client requirements. In some cases, new intermediaries emerge to accomplish this final tailoring.^{xxvii}

The supplier-client interaction is often a site of innovation. The **delivery** of the service to the client is the focus of many service innovations. There may be change in “front-office” or “field” activities, and also remote delivery of services to clients via new IT. While these are usually classified as process or sometimes product innovation, there are distinctive widespread trajectories of delivery innovation in services. The use of cashpoint machines by banks is a delivery innovation; the services supplied are typically a restricted version of those available from face-to-face contacts, so the conventional classification as a product innovation hardly seems adequate. Such a delivery innovation requires client travel to service supplier premises, though the hours at which the services is available are increased. Telebanking - ranging from on-line to telephone-based services - represents a delivery innovation, reducing space constraints as well as time ones.

In IT services, obvious delivery innovations centre on the medium of delivery - software can arrive in the form of firmware, floppy disc, CD-ROM, or Internet download. But many other services are introducing new forms of delivery, which may require co-operation from clients. There may be problems with client equipment needs. Some innovations like teleshopping require users to have their own terminals - here, plans may be formulated to provide equipment on a free or subsidised basis in order to facilitate the take-off of such services - as in France’s Minitel. Another barrier to electronic service delivery is also related to the reduction of personal contact - a problem when the services require idiosyncratic (and poorly structured) information from the clients, or the service supplier needs to win their trust and confidence by establishing appropriate expertise, reliability, empathy, etc.

Practically all KIBS are employing IT in their processes, but relatively few are extending this far into their delivery systems. KIBS are liable to require need for high interaction, trust, and confidence, during product design and delivery, (and often during subsequent use). This is why many professional services use highly traditional modes of delivery, such as reports and “live” briefings, enhanced only

slightly by IT in the form of Desktop Publishing, impressive graphics, and new presentation technology supporting face-to-face briefings. Though there has been much discussion in the IT literature about the use of new technology for disintermediation, and there are certainly people setting up as “knowledge brokers”, the importance of tacit and client-specific knowledge is a limit to innovation here. There are exceptions where the service is fairly standardised, or where it demands limited customisation (e.g. searching a database according to simple criteria) - here, the client can interact with the service provider’s knowledge base through a Human-Computer Interface. A software user encountering a problem (and unable to resolve this through the “help” facility provided with the software) may call a dial-up bulletin board or related service, where he or she can consult FAQs (frequently asked questions) or engage in dialogue with software engineers. The latter develop an electronic record of the problems revealed and other aspects of user needs.

Conclusions

Services are often major users of new technology, and that this is liable to become more common with new generations of IT. But it is at least as important to recognise that some services play more active roles in the development of a more knowledge-intensive economy. They may provide significant contributions to technology transfer process, or directly to the development of new technologies.

These roles remain largely unexamined. Official R&D statistics are only now beginning to encompass services’ contribution. A wider range of activities is comprised by services’ innovation than R&D data can hope to capture. Until systematic data are produced, we have only case studies and anecdotes to inform us as to how the “peculiarities” of services relate to their “peculiar” innovation practices.

Among the several critical issues here, the close interaction between suppliers and clients emerges as a critical factor for KIBS. This generates a complex innovation system, where responsibility cannot always neatly be assigned to specific partners in the process. Established approaches to understanding, measuring, and influencing, innovation processes are liable to find themselves increasingly challenged.

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ENDNOTES

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- i Hill, 1977; Riddle, 1986.
- ii Miles et al, 1990.
- iii Ducatel, 1994.
- iv For UK data see et al, 1990. More detailed analysis of Swedish data is provided by Jacobsson & Oskarsson, 1995. The dominance of services in IT use is a theme in the analysis of many different sets of OECD member states statistics by ICCP, 1993, which cites investment data, material on diffusion of specific technologies, and employee-based surveys dealing with the incidence of use of IT in different sectors and occupations.
- v Dicken et al, 1995 show service activities like finance, R&D, retailing, and architecture to account for a large share of Japanese investment in the UK.
- vi K Bozdogan, "Overview, Key Findings and Conclusions" in OECD Technology and Productivity: the Challenge for Economic Policy Paris, OECD, 1991(p140)
- vii Kleinknecht & Reijnen, 1991.
- viii Business Monitor MO14 April 1995, London, HMSO, which also shows that the proportion of defence R&D is approximately twice as much in manufacturing as in services in the UK.
- ix Rose, 1994, who also documents the importance of services in R&D alliances and networks in Canada.
- x OECD, 1993.
- xi Pollack 1991.
- xii For example, for French services: Belleflamme et al 1986; for Danish ones: Sundbo, 1993; for Dutch and British cases: Miles et al, 1995.
- xiii Pattinson et al 1995
- xiv Richard Barras, "Towards a Theory of Innovation in Services" Research Policy 15 (4) 161-173, 1986; "Interactive Innovation In Financial And Business Services: the vanguard of the service revolution", Research Policy, 19, pp215-237, 1990
- xv Keith Pavitt, "Sectoral Patterns of Technical Change: towards a taxonomy and a theory" Research Policy 13 (6) pp343-373, 1984
- xvi Luc Soete & Marcela Miozzo Trade and development in services: a technological perspective. Working Paper No. 89-031. Maastricht, MERIT, 1989
- xvii Though some retailers are themselves of a scale and importance to be significant sources of direction for their suppliers - witness UK supermarket chains' ability to set quality standards and identify new products for their suppliers.
- xviii The services "R&D Consultancy, Technical testing and analysis" account for almost 10% of current UK R&D - cf. Business Monitor MO14 April 1995, London, HMSO.
- xix Howells, 1988; Elfring, 1993.
- xx Work by PREST and TNO researchers detailed in Miles et al (forthcoming) op. cit. - my colleagues provided much insight on which I draw here. The case studies involves small and medium-sized firms, in the main, working in environmental, multimedia and telematics services.
- xxi The prevalence of low-skilled staff was often cited as a reason for low rates of service innovation, in the earlier literature. The use of ICT has often been embarked upon by firms with little understanding of the need for training (staff are often simply given a manual and asked to instruct themselves); and issues of work organisation often remain unexplored, so that the scope for new divisions of labour is discovered by chance or even ignored.
- xxii There is widespread recognition of a more general problem in accounting for ICT investment, which often does not seem to pay off by conventional criteria because it is introducing systemic effects.
- xxiii See the valuable discussions in Quinn et al 1990, Quinn & Paquette, 1990.
- xxiv Bessant & Rush, 1995
- xxv Pattinson et al 1995; Kleinknecht & Reijnen, 1991
- xxvi Sunbo 1993.
- xxvii On commoditisation in software, see Quintas & Millar, 1992