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Manufacturing Services and Servicing Manufacturing: Knowledge-based Cities and Changing Forms of Production

P. W. Daniels and J. R. Bryson

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Summary. There is an important shift away from production that is dependent upon material resources to production that utilises knowledge as the key source of competitiveness and innovation. Urban areas are key locations for a process that is also changing the way in which goods and services are consumed. The decade of the 1990s was a period of innovation and revitalisation in economic geography; it was also a time when economic geographers began again to explore old concepts in different ways—for example, new industrial spaces—intent on explaining the changing economic landscapes of capitalism. There is a real danger, however, that for economic geography the first decade of the 21st century will be a period of repetition and extension rather than one of development. This paper reviews aspects of the debate about the distinction between service and manufacturing activities and suggests that it needs to be reconsidered in relation to on-going and important changes in the production process that are as important for cities as they are for the economy as a whole.

Introduction

The on-going transformation of advanced economies from manufacturing to services has important implications for cities and for the organisation of economic activities. Increasingly, the production of commodities involves combinations of manufacturing and service functions. Such combinations can be achieved within a company or by organising a mix of internal and external expertise. Either way, they are accompanied by the continued development and refinement of the division of labour that is driving important alterations in the relationships between different parts of the production process. Both Mulgan (1991) and Lash and Urry (1994)

suggest that towns and cities should be increasingly considered as “centres for the switching of information, knowledge, images and symbols” (Lash and Urry, 1994, p. 220). This growth in the importance of knowledge has resulted in the ‘objectification’ of human capital (Castells, 1989) and its concentration in key locations, not least cities, affects both the operations of individual enterprises and the competitiveness of national economies. This evolving process is generating extended or complex production chains that are particularly well facilitated by cities because many companies rely increasingly on external advice.

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The range, availability and quality of professional expertise concentrated in key urban centres have important implications for peripheral locations. They may result in differential access to a whole series of strategic business service activities that play an important role in stimulating industrial development and innovations amongst client companies (Bailly *et al.*, 1987; Ley and Hutton, 1987; Bryson, 1997). The concentration of business service companies in cities generates new knowledge(s) and expertise which can, however, be consumed by any client, no matter where they are located, as long as they possess the capability to identify, access and utilise such service expertise effectively. Such information-rich environments also offer opportunities for individuals to create a reputation for a particular type of service expertise that may become of global significance. Service (urban) spaces contain information-intensive companies functioning as innovation, information and expertise transfer agents. Effectively they operate as pivotal information nodes in the global economic system (Castells, 1996).

The principal purpose of this paper is to explore the extent to which alterations in the production system—especially services-manufacturing relationships—are occurring and to suggest that they have some implications for cities and their economic competitiveness. Current government policy is geared towards stimulating urban and regional economic development in the UK using a raft of cluster development policies (Miller *et al.*, 2001) but this seems to leave little room for policies that address the increasing knowledge (service-sourced) content of production, the reliance of many firms on this external expertise and the need for a more holistic approach than that implied by cluster-based policies for economic development.

Services and the Production Process

Qualitative changes are under way in the synergies between manufacturing and service functions and in the ways in which manufac-

tured goods are produced, sold and consumed.¹ The production of goods has always relied on some services; even Alfred Marshall (1961, p. 63) observed that “Man cannot create material things” which Greenfield (1966, p. 5) interprets as implying “that all productive activities consist of services applied to pre-existing physical materials”. Such reliance may in the past have been confined to administration, book-keeping or sales, but it now extends to research and development, marketing, advertising, design, or product and service evaluations published by consumer magazines and broadcast on television and radio (Illeris, 1989; Marshall and Wood, 1995). In-depth interviews with more than 60 SMEs in the UK have confirmed the scope for rethinking manufacturing-service relationships (Bryson and Daniels, 1998b). A company that began life producing and selling software has now moved into the production of hardware, but via a sub-contractor. Another firm started out as a manufacturer of machine tools but has converted into a service company designing tools, handling the client relationships and sub-contracting the production of the tool/machine, but installing it for clients. This company is now considering making a return to manufacturing. Another company in the study specialised in the design (a service) and the manufacture of products for the optical industry.

For these and many other firms, service functions are assuming a more pivotal role in the production process. At one level, this is a reflection of a continuing escalation in the complexity of the division of labour (Sayer and Walker, 1992). At another, profitability increasingly depends not just on the manufacturing part of the production process, but on the knowledge aspects and service functions within which products are embedded: R&D, design, brand creation, advertising, finance packages, service package or upgrade packages are now the sources of profitability. These changes are associated with the ongoing blurring of the boundaries of firms that is increasing the complexity of the production system and altering the composition

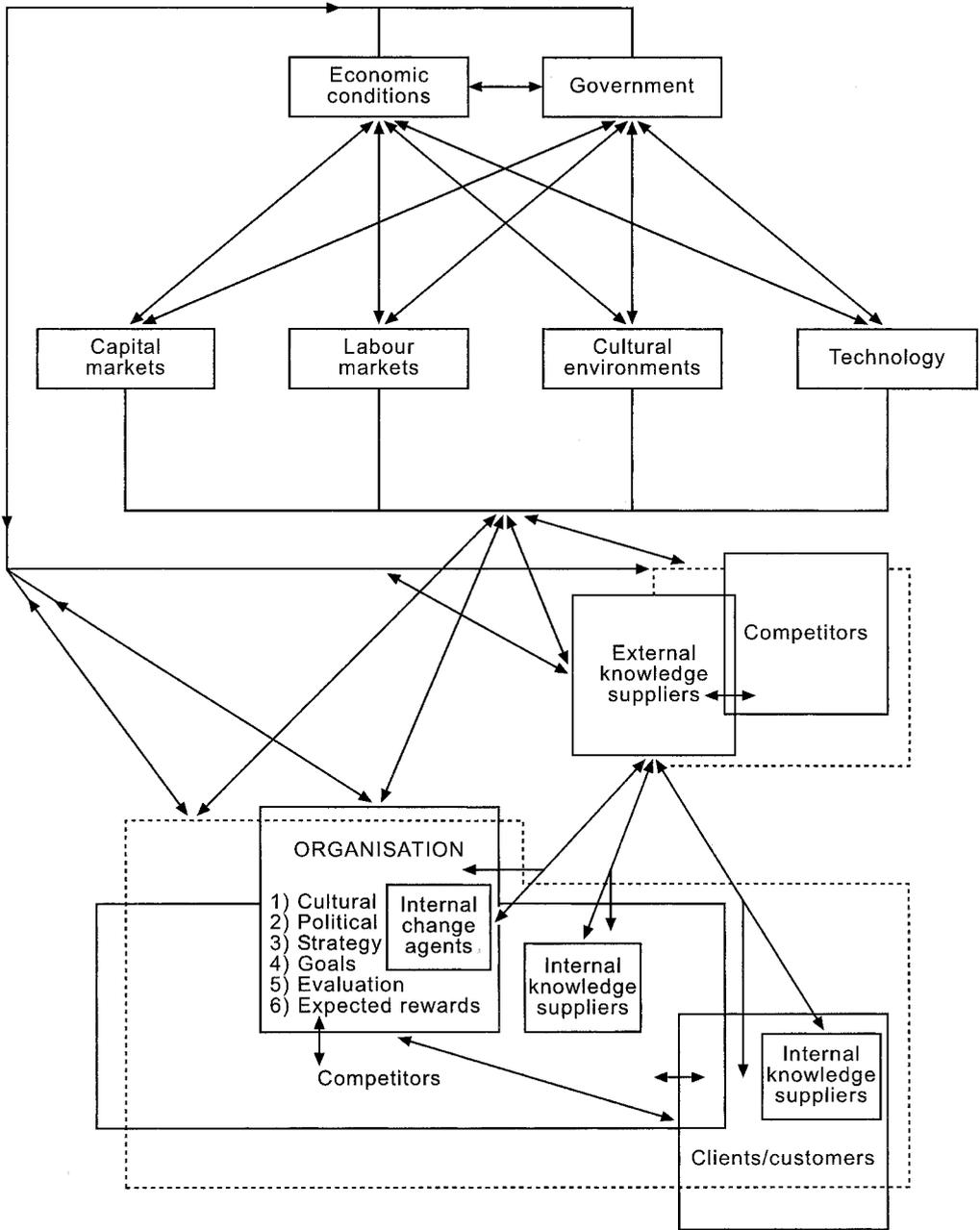


Figure 1. The structure of the production process and innovation drivers in the urban areas of advanced market economies.

of commodity chains (Figure 1). Four different processes influence product and process innovation in the production system. First, the institutional environment provides opportunities for innovation, as well as constraints

caused by the (un)availability of capital and of suitably qualified labour. For example, existing institutions such as a local university or ethnic-based business association or club may be regionally or culturally specific. Sec-

only, within firms, the existing culture, political values, management rewards and knowledge systems produce firms that respond to external pressures by innovating and others that experience difficulty responding to change. Thirdly, good relationships with existing customers or clients frequently lead to minor, and sometimes major, modifications to existing products or services. In such cases, geographical proximity or an established working relationship with key clients produces innovations. Fourthly, the provision and availability of services from management consultancy to advertising stimulate innovation. These elements, especially the development of client–customer relationships through e-commerce systems and the genesis of new services directly related to the production process, are the driving forces for change. The rise of knowledge-based production is heavily reliant on concentrations of service expertise; it is through such concentrations that experienced and qualified labour is produced and triggers the development of new firms, products and processes that are designed to enhance the knowledge capability of client companies. It is in cities, and especially evolving knowledge-based cities, that these skills and associated services are located. The on-going division of labour that accompanies an escalation in the complexity of production is altering the way in which production is organised. Many of these alterations associated with the blurring of organisational boundaries are also blurring the division between knowledge-based parts of the production process (or service elements) and the physical processes associated with the manufacture of products. It has been suggested that service functions now normally comprise 70–80 per cent of ‘production costs’ in most manufacturing companies.² If this is indeed the case, it raises questions about the ways in which the academic, as well as policy, communities conceptualise the economy in general, and that of cities in particular.

At issue, however, is not the debate about manufacturing versus service activities, but

rather a bigger debate concerning the ways in which services are manufactured and more importantly about the servicing of manufacturing. In many respects, the problem is one of how firms are classified and whether the classifications currently employed match the reality of increasingly undifferentiated firms. But analysis of the innovative capacity or competitiveness of clusters of economic activity or, indeed, of cities may be less than reliable if firms continue to be pigeon-holed as discrete entities dominated by manufacturing, service or primary sector functions in the way assumed by the standard industrial classifications that are widely used.

In a seminal paper that explores the distinctiveness and definition of services, Hill (1977) strongly argues that they deserve separate treatment from other parts of the economy because they possess attributes that definitely distinguish them from manufacturing (see also Illeris, 1989).³ This sense of being distinctive has been bolstered by efforts to classify certain economic activities as services for statistical and other purposes. At best, this is a frustrating task in the face of an ever-changing portfolio of new economic activities that is stimulated, for example, by the growing diversity and diffusion of information and communications technology (ICT). One outcome is that

official data sources ... tend to give more detail on old-established rather than newer forms of economic activity ... and ... it is little wonder that the notion of a *separate* ‘service sector’ is an arbitrary outcome of classification procedures designed for other purposes (Marshall and Wood, 1995, pp. 27–28; italics in original).

This problem endures. But does it matter? It is a moot point whether striving to produce industrial or occupational classifications that are specific to services (see, for example, Marshall and Wood, 1995) is worthwhile. This is surely the case if, as already suggested, services are now so heavily entwined with the economy as a whole.⁴

But the debate on the nature of service

activities in the advanced economies rages on. Gadrey notes that

There is no consensus today amongst economists as to the theoretical characterisation of service activities and their outputs (services), and yet ... it is generally assumed that certain differences do exist between tangible goods and services, and that these differences have an impact on economic analysis (Gadrey, 2000, p. 17).

For example, research is increasingly targeted at understanding the operation of particular service activities such as management consultancy, real estate or advertising services, and the identification of various types of spaces of consumption. The avowed distinction between service and manufacturing activities underpins much of this work. Discussions with colleagues based in emerging economies—such as those of Poland, Hungary and Slovenia—have highlighted an on-going debate about this distinction that has still to be reconciled (Ehrlich and Revesz, 1997). In many ways, it is similar to the debate—which was never really concluded—in the UK or in the US during the 1980s.⁵ It is therefore timely to revisit this issue, but not to engage with the debate on its own terms. Rather, the on-going adjustments in the ways in which service functions are being incorporated into the production process will be explored.

As a prelude, a brief overview is provided of the ways in which structural economic shifts involving manufacturing and services have been represented. Perhaps there has been too much eagerness to characterise the process as a transition from an economy dominated by one sector to one dominated by the other? The scope for a more integrated discourse is then explored by juxtaposing evidence that service relationships impart distinctiveness that merits separate treatment with evidence demonstrating long-standing manufacturing–service relationships. While there may be merit in both lines of evidence, it is suggested that in any event the way in which economies have been reworked—and especially the businesses within them—dur-

ing the 1990s has distorted the distinction between the two sectors and between a product and a service. The paper concludes with the suggestion that the artificial division between manufacturing and services is no longer sustainable in the light of recent and on-going alterations in the production process. It is also damaging for the formulation of urban economic policies that neglect the totality of the production system.

From Manufacturing to Services and from Services to ...?

[After] three centuries of economic thought on services, which were also three centuries of service growth, the current debates have changed, as attested by the numerous conceptual innovations. Nonetheless, the strong initial oppositions between positive and negative evaluations of their economic role stay alive (De-launey and Gadrey, 1992, p. 127).

Thus, Riddle is confident that “far from being derivative or parasitical, the service sector is a vital force in stimulating and facilitating economic growth” and the “service sector is, in truth, the facilitative milieu in which other productive activities become possible” (Riddle, 1986, pp. 22 and 25–26). In similar vein, Grubel and Walker (1989) are convinced that services are the vehicle by which new technology is introduced into the goods production process and thus are increasingly the dynamic forces driving the production of goods. Others are less enthusiastic:

It is not the case, as some service-sector researchers have commented, that the service sector is now the principal ‘engine of growth’ (Williams, 1997, p. 26).

It is not difficult to find advocates of the view that the growth of services as a distinct category is not so much a ‘physiological’ stage in economic development, as a ‘pathological’ aberration in this process (Galbraith, 1967; Bacon and Eltis, 1976; Reubens, 1981; Cohen and Zysman, 1987). But does this de-

value the evidence? Perhaps Ochel and Wegner are nearer the mark when they observed that the

distinction between goods and services (word processor versus software) may sometimes become increasingly archaic and irrelevant, because the integration of different types of production is growing and the traditional distinction is masking the fundamental changes which are actually emerging from modern technologies, new patterns of demand and social behaviour (Ochel and Wegner, 1987, p. 11).

Such divergent interpretations of the place of services in the economy have of course been widely explored in the services literature (Illeris, 1996), although limited attention has been given to the efficacy of the generic terms 'manufacturing sector' and 'service sector' (see, for example, Bryson and Daniels, 1998c). Indeed, 'service' and 'manufacturing' (or 'secondary' and 'tertiary') may be terms that are restraining our understanding of contemporary economic processes. Even the idea of an economic 'system' or of 'linkages' between manufacturing and services also perpetuates the notion that they are separate segments of the economy. It is surely difficult to identify a manufactured good that is not either the product of service activities or embedded in a set of service relationships? At a very simple level, manufactured goods are the end-result of market research and of design, while sophisticated advertising creates demand for them. On the other hand, many service activities, spanning specialist medical treatment to world-wide parcel delivery, would be impossible without manufactured commodities.

The emphasis placed on performance, display and embodied knowledge as key features of the client-service relationship further underlines the hybrid identity of services (Allen and du Gay, 1994; Crang, 1994; Rapport, 1998). Perhaps this has been somewhat overlooked in the context of the manufacture and sale of products/goods? Customers can experience, and be entertained by, the manufacturing process by exploring the visitor

centres of multinational companies such as Cadbury Schweppes, Ford or the Boeing Company. A good example of this form of manufacturing 'performance' is Autostad, Europe's first automotive theme park recently opened by Volkswagen (a £238 million investment). This 25-hectare 'car town' is adjacent to the company's main production plant in Wolfsburg, Germany, and according to its Chief Executive it is more "communications platform" than theme park ... "it's a new way of giving and getting information. The idea of staying in the memories of people is important to us" (Yarrow, 2000). Autostadt is all about extending brand awareness and developing a 'service' style of relationship between the manufacturer and its customers. This is VW's attempt to convert its knowledge and expertise into a visible interactive display that can be experienced directly, rather than through sales literature. Similarly, car brochures and other forms of sales promotional technique or methodology are a form of remote performance aimed at persuading potential customers that the company has the reputation, experience and knowledge to provide a vehicle that is safe, efficient, reliable and value for money. Part of this involves a 'language game' played between the consumer and the producer in which the language used tries to persuade the consumer that a particular manufacturing company can supply a better product. In the case of VW, one of Autostadt's messages is about the translocation of the fun of participating in the facilities at the theme park to the experience of driving one of VW's cars. This is a performative form of manufacturing-customer relationship.

Also worth mentioning are the manufacturing employees who sometimes become visible as a form of embodied knowledge in discussions with customers, as part of a complaints procedure or as individuals to be observed in advertising material, television documentaries and news reports. Therefore, to identify a divide between manufacturing and services requires an answer to the question: When does the manufacturing process

stop and the service function commence? The suggestion here is that this is a meaningless question. Both exist conjointly and are part of the one process or, to use an analogy, the chicken cannot come before the egg or, indeed, the egg before the chicken.

Towards an Integrated Economy: Long-standing Service-Manufacturing Relationships

While there has been acceleration in the coming-together of goods and services production in recent years, there is actually nothing new taking place. The production of goods has always relied upon, or incorporated, services. Most of those who have written about services concede that there are important overlaps with manufacturing. The four analytically distinct ways in which the term 'services' can be used illustrates the point (Gershuny and Miles, 1983; see also Townsend, 1997; Bryson and Daniels, 1998c). First, the term refers to industries that form a residual set of production institutions in the formal economy whose final output is *not* a material good. Secondly, it refers to products, all of which are not necessarily produced by service industries; manufacturing firms frequently generate services in the course of their manufacturing operations and often package them with goods. Thirdly, the term 'services' is used in relation to a set of occupations that may be confined to specialised service industries but which are also found across the full spectrum of industries. Indeed, the growth of service occupations within individual firms has invariably been at the expense of manual occupations. Fourthly, and finally, there are service-type functions performed by individuals that may or may not be part of the formal, money economy. Households or individuals may produce their own service functions as part of the 'self-service economy' (Gershuny, 1978; Gershuny and Miles, 1983). The latter is seen as provoking a need to reconceptualise the nature of the [service] economy.⁶ This is approached from the per-

spective that service innovations are very broadly based phenomena "involving the whole of the economy, not just the final service industries themselves" (Gershuny and Miles, 1983, p. 43; see also, Bell, 1973). The upshot of their analysis, however, is the adoption of a different way of classifying services rather than shifting the 'boundary' between what Gershuny and Miles refer to as industry (manufacturing?) and services.

There is another literature that cites the importance of technological change but which also stresses the impact of changes in methods of production (Greenfield, 1966; Stanback, 1979; Barse and Karasek, 1981; Noyelle and Stanback, 1983). As production—especially in the advanced economies—has become more flexible, it has created demand for intermediate or producer services that facilitate the organisation and the deepening sophistication of production. Producer services enable and finance trade in goods as well as in services. They articulate the information and knowledge embodied in the human resources that are central to the new production structures. They are supplied by specialist firms to clients or may be produced internally; and they are pivotal to the spatial organisation of the production system as a whole (Sassen, 1990, 1994; Daniels, 1993). However, although this 'production-driven' analysis may well help to explain the growth of employment and output in the service sector, it clearly provides only part of the picture.

Is it possible that researchers have actually been guilty of a rather simplistic conceptualisation of manufacturing activities? They are seen as just the manufacture of a product, rather than as the creation, manufacture *and* after-care of a product. Perhaps those consumed by an interest in services have inadequately deconstructed the manufacturing process? We have implicitly retained images of conveyor belts and line workers as *the* production process. If we reconsider our 'template' of manufacturing, what emerges is a process occupied by engineers, designers or production managers—who are service workers—and a group, shrinking in size,

which actually produces the goods—the manufacturing workers (see Crum and Gudgin, 1977). In this conceptualisation, the main difference between a manufactured product and a service product is that the reputation of service workers is either based on their own abilities and reputation or constructed around the reputation of the company.

A little more flexibility in our way of thinking and we can begin to think about manufacturing in a similar way—as constructed on reputation and a form of display. Thus, the design of a good incorporates many elements that are not essential to its operation; they are incorporated as a display feature to encourage purchase by target clientèle. A good example is Marantz, a firm that produces hi-fi equipment including amplifiers. These products incorporate the signed initials of the sound engineer who designed them ('KI', Ken Ishiwata). This is an example where a manufacturing/service employee has developed a reputation that is being used to sell the product. More broadly, the process that lies behind the construction and maintenance of a manufacturing company's reputation or image is similar to that involved in the construction of the reputation of a professional service worker or company. Thus, the reliability of the product and its design, cost, degree of innovation and support services are all part of the development of tangible and intangible components of a company's reputation. Like a service, the competitiveness of branded manufactured products (VW, BMW, Gap, Gucci, Chanel, Honeywell, Grundfos, etc.) depends on a set of intangible factors—reputation, image and display. It is also important to remember that, just like the purchase of services, material consumption is also driven by experience, repeat purchases and word-of-mouth. Perhaps, therefore, service research has reached the end of a beginning and this new beginning should be centred on a service-informed analysis of manufacturing. We could just forget about the terms 'services' and 'manufacturing' and just think about 'production'.

Distinctions Created by Service Relationships?

It is still necessary to confront the idea that services possess distinctive, possibly unique, characteristics (Illeris, 1989, 1996; see Miles, 1993, for a detailed list of the features considered distinctive to services). The producer and the user are more or less involved in bringing about a 'change of condition'—which may be irreversible (see Hill, 1977)⁷—and hence must be co-present in time and place (de Bandt, 1991).⁸ The user participates in the production of the service—'servuction', the service delivery system (see Eiglier and Langeard, 1987)—and this relational character means that services are typically labour-intensive.⁹ As a result, it has been argued that the basic economic concept of the 'market' is difficult to apply (see for example, de Bandt, 1995). But is it any easier to apply concept of the 'market' to manufacturing if, as already suggested, marketing and the product are about display and the construction of a brand or product image?

The distinction afforded to services via the 'service relationship' has received most attention from researchers in France (de Bandt and Gadrey, 1994). They are interested in particular in

the existence of tight relations and especially strong interactions between producers and customers. Some authors attach more importance to this characteristic than others, but it is always taken into account (Delauney and Gadrey, 1992, p. 126).

This focus on service relations, if taken in its widest sense, may be much more valuable than efforts to differentiate between goods and services. Hatchuel (1994) has suggested that the design, development and supply of material goods or equipment is always undertaken within the framework of particular 'service models'. Without these models, the creation and transfer of the goods exchanged would remain unintelligible and this is true for the 19th and 20th centuries, as well as in the present century. Hatchuel argues that recent forms of services are forcing a rethink

of our vision of economic exchange, not least in industrial economics that, he suggests, has been preoccupied with images of the economy most appropriate to mass production industries. If 'service' and the 'service relationship' are not confined to the connection between service firms and their clients, it is also worth noting that the term 'product' is equally difficult to specify for the supplier of material objects. He cites the example of the 'product(s)' of a bespoke tailor. He states that the tailor (or cutter?)

places his skills at the service of his clients, and that out of their meetings and their reciprocal efforts to understand the other's wishes will eventually come forth an object, which must conform to the purchaser's desires (taking account of his economic position) and which must belong to the family of products capable of being made by our tailor (Hatchuel, 1994, p. 2).¹⁰

It then follows that, first, the expression 'in the service of' ultimately means a relationship between two actors based on mutual arrangement. Secondly, the circulation of goods that might form part of a mutual arrangement can only be understood by linking these goods to the projects or knowledge that the actors mobilise in respect of them.¹¹ Thirdly, the service relationship can only be made between actors who make asymmetrical commitments and perceive them as such. There are producers or service providers offering material or immaterial goods on the one side, and clients prepared to satisfy (for a set price) a given number of necessary conditions for the creation or enjoyment of these goods on the other. Fourthly, the service relationship surrounding a material object—such as the value of a painting, a sculpture or a personal computer—is on a par with the skill required to measure the suitability of a new recruit or the competence of a management consultancy firm (see Hatchuel, 1994, pp. 2–3). Indeed, in many such cases, the parties in the relationship resort to evaluation by third-party experts to formulate their desires or judgements.

Using examples taken from the economic

history of the production of silk fabrics, wall-paper and furniture in the UK, France (Lyon) and Austria during the 19th century and the motorcar in the US during the 20th century, Hatchuel (1994) suggests a chronological ordering of successive models of services. Note the use of the term 'models of services' rather than 'models of production', even though material goods are involved. The first model is based on work to order in response to the needs of a small number of clients with the knowledge and the resources to support this type of transaction. The next model in the sequence involves the low-cost supply of a uniform service for the greatest number of clients. Its principal guise is the Fordist model of mass production accompanied with only limited service.¹² This evolves into the third model that is based on the supply of product variety in response to clients who are progressively differentiating their relationship to the product or service. The fourth, and most contemporary, model links supply to the problems of temporal availability and the expansion of assurance-like services.¹³

It is possible to see how these service models, derived from a review of the manufacturing process over 150 years, are also applicable to service industries, especially since many of them do not work to customer specifications. Airline, bus or rail services, for example, run to a fixed schedule (although provide a different service experience depending on the class of travel), automatic teller machines offer a fixed range of services, while fast food or Chinese take-away restaurants have fixed menus. Even if an activity such as management consultancy does offer a tailor-made service in close consultation with the client, the product is essentially non-material. This makes it difficult to provide assurance-like support because of uncertainties about its actual impact on the client's requirements (Barcet and Bonamy, 1994; see also Bryson and Daniels, 1999). Therefore, far from leading the way with service models, many service industries are actually still trying to enrich their organisational forms and service delivery systems in order to give more weight to client prescrip-

tion along lines already traversed by manufacturing. Service industries are now actively seeking customer loyalty (air-miles, store cards, points for purchases, cash-back arrangements) or offering various modes of payment or preferential interest rates dependent on client status and credit rating (segmentation). Some well established but 'fossil' retailers such as Boots are diversifying into direct services to clients such as dentists, opticians and health and beauty clinics where profit margins are many times greater than those accruing from sales of shampoo or toothpaste (Jardine, 2000). Other types of service organisation guarantee results within a specified time or greater continuity for their services (vehicle breakdown, for example) or provide 'one-stop' facilities (such as retail supermarkets offering banking and other financial services under the same roof). All these are simply emulating models that already have their precursors in manufacturing, making the case for the distinctiveness of the latter somewhat questionable.

Fuzzy Boundaries and New Forms of Production

The changes identified so far in this paper are being compounded by the business revolution that has taken place during the past decade. First, there has been acceleration in all aspects of business activity. Product development no longer takes years; a period of 6 months from initial idea to final product is becoming the norm and, in some sectors, such as clothing, in-house designers and cutters have reduced the period from design to delivery to the store to 2 weeks (Alexander, 2000; Davis and Meyer, 1998). Trading in financial markets takes place almost instantly, rather than overnight following an exchange of documents (Laulajainen, 1998). Receipt and despatch of orders for many goods and services are now expected overnight or at most within 24 hours. Secondly, intangible assets or non-physical factors increasingly determine economic value. The costs of the materials used in Rolex watches, BMW cars or *haute couture* clothes

do not account for their premium prices; intangibles such as brands, customer relationships, status, research and marketing certainly do.¹⁴ There are now not only symbolic analysts (Reich, 1991), but also symbolic goods and places (designer clothes, limited-edition cars, houses, mobile phones, fashionable wine bars, exotic holiday destinations, exclusive shops, etc.). Many products are sold with inclusive service contracts and insurance (Illeris, 1989). Thirdly, the interconnections between consumers, producers and nations are becoming more varied as well as closer; witness the phenomenal growth of the Internet, not just as a source of information exchange, but also for commercial transactions (e-commerce).

Sectoral blurring is continuing with firms no longer competing in one realm (services) or the other (manufacturing) and it is hard to sell anything that is not a hybrid of both. Cars are the ultimate industrial-age product, but come with services such as navigation systems, security tracking devices, in-car entertainment systems, vehicle service indicators and, most importantly, financial packages. Financial services are increasingly being provided through software (a cheap product) that can be used to access advice, accounts or trading in shares and other financial products. The combination of connectivity, intangibles and speed has also modified the means of production so that the manufacturing plant is increasingly less scarce (i.e. there is overcapacity in certain key sectors) and less valuable than talent, experience and knowledge (intellectual capital).

The development of web-based companies for the sale of branded products is creating internal expertise that adds significant value to the retailing potential of successful websites. This expertise is difficult to develop and acquire and increasingly companies seeking to establish a presence on the Web are choosing specialist expertise to provide advice rather than general management consultants. Consequently, companies that have established a successful commercial website are acquiring added value through the sale of

their Web expertise as well as through the sale of products via their website. The best example is *Easysshop*, a website dedicated to the sale of lingerie which has established a consultancy company, *Knowledge Systems*, that focuses on helping clients bring the web into their business. In this case, the boundaries between consumer services and producer services are fading, as retail companies are becoming consultancy companies through selling their internal knowledge and expertise.

Management consultancy companies are also being transformed into companies that produce products as well as provide services. This is a new trend, a new form of blurring of the manufacturing-services border. Price-WaterhouseCoopers (PWC) has established a company through which small and medium-sized enterprises (SMEs) can purchase their office supplies. PWC obtains significant discounts from the suppliers and passes some of these discounts on to the SMEs. One of the rationales for the establishment of this company is that it provides PWC with an opportunity to develop a relationship with a group of business enterprises that can be used to sell other services. Andersen Consulting, recently rebranded as Accenture, provides another example. In 1992, Andersen Consulting Enterprises was established with the aim of developing as a medium for developing business concepts that could generate non-consultancy revenue. PRA Solutions, the first business to be established, was formed out of a consultancy project involving Air Canada's airline-ticket processing system. Andersen became an airline-ticket processing company in its own right and PRA now processes 31 per cent of all airline tickets around the world. With operations in 3 continents and 6 countries, PRA processes 1 million electronic transactions a day at a cost saving of 30 per cent to its airline customers. Thus Andersen Consulting has become more than just a consultancy company. Will the next stage be the establishment of manufacturing-based businesses by the global consultancy companies?

One final example of the fuzzy or blurring

divisions within the economy is the seller-buyer transaction. Traditionally, the relationship is based on an exchange of money for product, but businesses such as Amazon.com encourage those who scrutinise its pages to send in book reviews. Remuneration is available for well-crafted reviews that inform potential purchasers. Thus, the seller-buyer relationship is changed to a two-way exchange of money *and* information. A growing list of products, especially at the more expensive end of the market, is accompanied by questionnaires, lifestyle magazines and even focus groups recruited from amongst those who fill in the product questionnaires. The intention is not just to improve the service or value of the product to the customer, but also to inform its future design, refinement or marketing in ways that increase the chances of repeat purchase and customer brand loyalty.

'Discrete' service or manufacturing companies are being replaced by, or being transformed into, manufacturing/service companies or conglomerates. The manufacturing process is becoming increasingly a service process. There are a number of reasons for this. The competition in the field of manufactured products demands that a company's client-base is utilised as fully as possible. By including service-driven relationships, profits can be sustained more reliably. In addition, manufactured products are simultaneously more complicated, more reliable and have longer life-expectancy. Service relationships compensate for these effects, as well as enabling firms to foster long-term relationships that may translate into further transactions with their clients. Finally, the PE ratio (a measure of the relationship between perceptions concerning the future profitability of a company and its share price) for manufacturing companies tends to be lower at present than for service companies. This has had the effect of encouraging manufacturing companies to diversify into services or service-related activities. Manufacturing firms are traditionally less concerned with relationship marketing of the kind that allows service companies to build

on initial sales either in the form of later sales or feedback that is used for product innovation which might result in further sales to the same set of clients. With manufacturing companies more explicitly incorporating service-type activities into their relationships with consumers, we are seeing the breakdown of the distinction between the manufactured and service component of a product.

Conclusion

The terms 'manufacturing' and 'services' have been useful for charting structural shifts in employment, but they are now an impediment to the way in which economic geographers and the policy community think about the structure and operation of both the economy and economic organisations. The dynamic nature of the manufacturing-service interface seems to make the artificial division of these two economic sectors unsustainable. If this is the case, then it seems realistic to suggest that economic geographers have to reconsider the boundaries that they place around economic activities. Although the economy may know no boundaries, observers have a bounded understanding because that is the way that they work. The implication of some of the changes outlined in this paper is that the distinction between service and manufacturing activities is even less clear than it may have been in the past. Assuming that the distinction is still important, it tends to 'ring fence' the way in which economic geographers conceptualise economic activities. By extension, a reconceptualisation of the way in which social scientists specify boundaries between economic activities is now required.

Service/manufacturing terminology needs to be replaced by an emphasis on two sets of related issues. First, a focus on knowledge and information flows that will identify and explain the complex web of connections that exist within and between companies. The flow of knowledge within and between organisations is one of the key foci for contemporary research in economic geography

(rather than producer services as one of the sources of knowledge and expertise) (Bryson and Daniels, 1998a; Bryson *et al.*, 2000). Such a focus would identify the structure of an economic sector rather than service or manufacturing components. Secondly, for too long service researchers have ignored manufacturing companies on the grounds that there is something special about the service relationship. Perhaps it is time to forget about this distinction? It is time to develop a service-informed understanding of the manufacturing sector. This would highlight the service aspects of manufacturing and at the same time reveal the difficulties of continuing to classify activities as either services or manufacturing.

A focus on knowledge as *the* key factor of production brings us back to the importance of cities as pools, or potential pools, of educated workers as well as providing environments that are conducive to co-present interaction between companies. Urban resources such as universities and science parks are becoming more clearly incorporated into the production system. Such environments need to be nurtured in order, first, to continue to attract educated workers and, secondly, to provide places for the interaction that leads to new products and new innovations. The concept of a knowledge-based city implies alterations to current policy frameworks to ensure that the likely/possible relationships between companies and/or people are actually facilitated. The changing nature of production implies a growing spatial division of labour between the knowledge parts of the production process and the actual manufacture of products. There is always the risk that the knowledge element that is now at the heart of the production process also begins to relocate from cities in the advanced economies in search of superior working environments or lower factor costs. Care is needed to ensure that policies are developed that cover all sectors of the urban economy, manufacturing and services, because they are now part of one, highly integrated, system of production.

Notes

1. The Office of Science and Technology's Foresight Panel on Manufacturing 2020 recently observed that the

nature of manufacturing is changing ... so that service is no longer seen as something outside the realm of the manufacturer. Manufacturers must get to know their customers better and compete on the total service package (Report URN 00/1380, February 2001, p. 2).
2. These are classified into: before manufacturing (financing, research); during manufacturing (finance, quality control, safety); selling (logistics, distribution networks); during products and systems utilisation (maintenance, leasing, insurance, after-sales servicing, repairs); after products and systems utilisation (recycling, waste management) (Giardini, 1997).
3. Hill has recently reiterated his view that, given modest revisions—such as an elaboration of the concept of 'intangible goods'—there is no reason why new services phenomena cannot be brought within the scope of established theory and best practice (see Woodrow, 2001).
4. Some would argue that services still need more attention in relation to major statistical indexes such as producer price indexes and labour productivity. For example, the US Department of Labor's Bureau of Labor Statistics started expanding its coverage of services in the PPI in 1990 and has set as a goal the publication of an aggregate PPI index combining goods and services by 2002. Currently, the Index only covers industries that account for 34 per cent of services output (see Blackstone, 1997).
5. For example, there have been changes in the nature of work, such as the rise of knowledge-intensive labour, which have challenged conventional classifications (Frenkel *et al.*, 1995). The language of occupational classification has moved on from white collar/blue collar (status), clerical or managerial (function) to terms such as routine, information or knowledge worker. These terms are less overtly service-related or manufacturing-related; the application of creativity, knowledge and skill is important to production in both sectors. Perhaps classification should not be in terms of activity, but of function or the use of wider notions of production. As Illeris has wryly observed

difficult to define. The same is true for services (Illeris, 1989, p. 8).
6. According to this thesis, the increased demand for services by households does not translate into external demand from market or public services; rather, household service needs are met by purchasing goods that are used privately or collectively in the home. The self-service economy therefore increases the demand for goods rather than services. It seems easier to reconcile this approach with the consumption of private (market) services than with public services such as education or health. However, ICT now enables distance learning or self-diagnosis from home and it may only be a matter of time before 'self-service' becomes important.
7. The notion of 'irreversibility' must be treated cautiously. A medical operation to replace a hip joint may be irreversible in the sense that it is not possible to return to the condition prior to the operation, but it *is* possible to replace the artificial hip with a new or better prosthesis. A life insurance policy can be sold or replaced with another, or a consultant can provide advice that changes a company—only for this to be reversed, perhaps, when another consultant is subsequently used.
8. Thinking about manufacturing in this context, the user of a machine has in many cases to be co-present with the machine in time and space. In Marxist language, the machine represents 'dead labour' but in service terms 'remote labour'. There is, for example, a very close relationship between producer and consumer for the manufacture of machine tools.
9. As an aside, interviews with car companies have highlighted the experiential nature of the car-purchasing process. Design is targeted at those parts of the car that can be experienced in the showroom; the best example is the design effort expended on car hinges so that doors open and close smoothly.
10. The tailor's (or cutter's) skill also involves articulating either a craft-based or a factory-based manufacturing process. A fully crafted Saville Row men's suit costs £22 000; a factory-made Saville Row suit costs £700. Both use the same material except one: the factory-made suit is glued together overseas (the facings, etc.), while the other is stitched by hand, usually in London. This suggests two processes: the service relationship (cutter and client); and, the manufacturing process involving the relationship between the management of the company and the 'pro-

Elephants are easy to recognise, but quite

duction' tailors, whether in London or overseas.

11. A material good might be the main cause of the relationship (buying a book from Amazon.com or ship from an industrial firm) or it might be the secondary cause of the relationship (the needle used by a dentist to anaesthetise a gum before commencing treatment).
12. Although there is an element of service embedded in the product.
13. Contemporary service models embraced by manufacturing (and services) include: extension of product variety by work to order, product personalisation or incorporating service dimensions into service design; 'just in time' such as overnight courier services, pizzas delivered to your door in 30 minutes, same-day personal loan decisions by banks, camera film processed and prints available within 1 hour; car servicing while you wait, eye-test and spectacles provided within 1-2 hours (the list is endless); assured service provision covering items such as maintenance, quality assurance and guarantees.
14. Brands are now to be valued as assets in company accounts because they can be shown to be valuable to shareholders; see Haigh (1998).

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