

Services, Products, and the Institutional Structure of Production

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Abstract

This paper is concerned with the role of services in firms where product-service combinations are the norm. Much of the literature has focused on the intrinsic characteristics of services with a view to derive implications for the management of service-based firms. Our key argument is that the quest for foundational differences between products and services is misguided. What counts as a product or a service is dependent on the nature of producer-user interactions and the institutional structure of production rather than on any essentialist attribute of products or services. Furthermore, we argue that services play an increasingly important role in manufacturing firms and we explore the reasons that underpin this trend. The paper ends with a plea for a better understanding of product-service combinations and businesses that derive revenue streams from both product and service-based operations.

Keywords: product-service distinctions and combinations

Introduction

This paper revisits the long-standing foundational distinctions between products and services that have long since dominated the literature on services management. Traditionally, this literature has focused on establishing these differences before proceeding to derive implications for the management of service as opposed to product-based firms. Businesses are thus either product or service-oriented and the management of service companies deserves a specialised treatment.

In this paper, we argue that the quest for foundational differences between products and services is misguided and that given that many firms are both product and service-based, we need a better framework for understanding how products and services coexist within the same firm. Thus rather than focusing on the differences between products and services, we emphasise their symbiotic interdependence in interorganisational networks. A product such as laptop computer, for example, inserts itself into a network comprising manufacturers, retailers, software firms, users with a set skills and expectations, Internet service providers, certified repairers and so on. In this network, there are a variety of service providers and different types of service interactions that accompany the life of the product from the moment it rolls out of an assembly line to its final disposal. Some of these services are highly scripted, standardised and require minimal interaction between the producer and user (e.g. connection to the Internet) whilst others are much more customised, open-ended and interactive (e.g. detection and repair of faults).

Our second main argument is that what counts as a product or a service is determined by the institutional structure of production, namely the boundaries between modes of economic coordination. These boundaries are neither given nor stable and the distinction between products and services is often more reliant on how these boundaries are drawn rather than any aspect concerning their production or use.

The paper is organised as follows: in the first section we review the literature on service-product distinction focusing mainly on marketing contributions. In the second section, we look at a much-neglected contribution from economists who, in the course of examining the emergence of a service economy, have provided valuable insights on the nature of services. In the third section, we examine what makes services and products tradeable and the impact of institutional structures on what counts as a product or service. In the fourth section, we look at recent literature that has exhorted manufacturers to expand into services and argue that an expansion in service provision in manufacturing is an inevitable by-product of the increasing division of labour, outsourcing and the disaggregation of corporate hierarchies. The paper concludes with an argument for focusing on the type of exchange relationships that different types of products, services and product-service combinations engender rather than attempt to distinguish between product and service-based firms.

The Service-Product distinction

The distinction between products and services has a long history in Marketing and other disciplines, namely Operations Management (see e.g. Johnston, 1999) and Management (see e.g. Bowen and Ford, 2002). In Marketing the focus was firmly on products and services were often regarded as little more than a peripheral activity that added value to a product. Kotler (1980, p. 374), for example, noted cryptically "...a service is not a physical thing but rather an energy expenditure". The focus of this literature is on the special characteristics of services vis-à-vis products and the marketing implications stemming from these idiosyncratic qualities (Lovelock, 1983).

Fisk et al (1993, p. 68), for example, remarked that the "...four features – intangibility, inseparability, heterogeneity and perishability – provided the underpinning for the case that services marketing is different from goods marketing." To this day, marketing textbooks (see e.g. Kotler, 2003) have relied on these dimensions to convey the notion that services marketing needs to be approached from a different angle. Bowen and Ford (2002), for example, organise their comprehensive review of the differences between manufacturing and service organisations based on the same four dimensions.

The implication that can be extracted from these statements is that services are what products are not, and that product-based marketing needs to be adapted for service environments. As Groonroos (1998, p. 235) memorably put it: "The most important change

from the product marketing situation is that *the product is missing* [emphasis added]. Only occasionally have service marketing authors acknowledged that "...important differences exist between service firms, not just between service firms and goods firms" (Zeithaml et al 1985, p. 43).

In addition, the literature has often focused on the process nature of services. Whereas products appear as pre-produced at the consumption junction, the production of services is performed in a process in which customers interact with the production resources of the service firm (Grönroos, 1998). Service consumption is thus deemed to be process consumption whereas products are fixed packages of features that do not change during the consumption process.

The notion that service firms have processes rather than pre-produced products as solutions to customer problems raises a few important questions. First, it is not unusual in business markets for customers to either request customised products or to actively negotiate with suppliers the specifications they require (Araujo et al, 1999; Spring and Dalrymple, 2000). In short, these firms don't buy pre-produced products and there can be a fair degree of interaction between the resource structures of producers and users. Secondly, it is not common for some services firms, namely professional services such as law or advertising, to produce customised solutions based on repeatable packages either through straightforward repetition of tried and tested processes or recombination of pre-produced modules (Brousseau, 1995; Grabher, 2004). Finally, there are many service examples when the customer's interaction with the resource structure of the producer can be fairly minimal or inconsequential as when a utilities customer switches on the lights at night or connects a computer through a modem to an Internet service provider.

In summary, the process versus outcome distinction may well work in situations where customers are insulated from interactions with producers' resource structures. However, the fact that the process of service provision is in many cases short-lived and doesn't provide a window on the supplier's resource structure is another argument that highlights the fragility of the process versus outcome distinction.

More recently, service marketing writers have begun to attack the foundational differences that have helped services marketing develop as a separate field. Vargo and Lusch (2004b) and as Lovelock and Gummesson (2004) make parallel attempts at debunking the myths underpinning the four foundational attributes of services. Thus when examined in detail, the four distinguishing characteristics of services are found wanting and numerous exceptions can be invoked to counter the supposedly watertight distinction between products and services. For example, tangible goods are often heterogeneous and many services can be mass produced without difficulty, as Levitt (1972) noted long time. The variability of services can be controlled through strict quality procedures, standardisation of service modules, and automation of service functions (Lovelock and Gummesson, 2004). In an argument reminiscent of Levitt's (1972) aphorism that "everybody is in services", Vargo and Lusch (2004b) propose that services are more universal than goods. In their words, services are the "...application of specialised competences (skills and knowledge) through deeds, processes and performances for the benefit of another entity or the entity itself (self-service)" (*ibid*, p. 326). The corollaries of the argument that "everything is a service", is that manufacturing and exchange should be seen as services and products as vehicles for service delivery. Furthermore, Vargo and Lusch (2004a) contend that marketing inherited from economics the notion that value is embedded in products and usage is directly related to product features. Instead, they propose that through product usage, customers are co-opted in the value creation and delivery process. Exactly how value through product usage is created, we are not told.

Levitt (1981) pinpointed the limits of the traditional distinction between products and services and focused instead on the marketing of tangibles and intangibles. At the hub of Levitt's argument is the distinction between products and services whose qualities can be experienced and tested in advance and those that cannot. If it is true that intangibles cannot be assessed and tested in advance, it is equally true that for many complex products the process of installation and appropriation into the user's value system involves a lot more than the product itself. As Levitt (1981, p. 97) puts it: "...you won't know how it performs until it's put to work". The conclusion that Levitt extracts is that if tangible products must be "intangibilised" to stress benefits in use, intangible products must be "tangibilised" – or to create metaphors or surrogates for tangibility" (*ibid*, p. 100). Relationships with customers in the case of intangibles need to be managed more carefully and continuously than in the case

of tangibles although Levitt stresses that this is a vital for products too, notably in case of new and complex products.

The trick of turning the tables by affirming that “everything is a service” elides the question of the role of products in service provision. Put differently, why then are so many services delivered through products rather than through other means? Surely, there must be some advantage in embedding service provision in products if we are to accept the truism that “in the end it is all about service provision”.

In summary, the product-service distinction founded on the four idiosyncratic features of services as well as process versus outcome consumption doesn’t bear much scrutiny. If anything, recent contributions that have suggested the balance should be swung the whole way towards services, have shied away from a more measured approach concerning why, how and when should particular product-service combinations be deployed to address particular types of demand. In the next section we look at approaches to the definitions of services that have been used by economists addressing the problem from an institutional and national accounting perspective.

An Institutional Perspective on Service Definition

In the economics literature, the contributions of Hill (1977, 1999) and Gadrey (2000) deserve a special mention. Hill (1977) argues that a necessary condition for some item to be a good or a service is that it must be capable of being the subject of a transaction between two or more different economic units. To identify the characteristics of goods or services, the focus should be on the interaction between producers and users.

For Hill (1977, p. 318) a service “...may be defined as a change in the condition of a unit or a person, or of a good belonging to some economic unit, which is brought about as a result of the activity of some other economic unit, with the prior agreement of the former person or economic unit”. The focus on producer-user interfaces leads Hill (1977, p. 320) to reflect on how the institutional structure of production is critical for the definition of services:

“...one and the same activity such as painting may be classified as a good or a service depending purely on the organisation of the overall process of production amongst the different economic units. [...] some changes in the share of service industries in total output or employment may be determined purely by changes in which production is distributed amongst different producers and may have no influence whatsoever on the share of services in the final expenditure.”

Hill (1977) insistence that unlike products, services cannot be exchanged between two economic units since no property rights can be attached to services raises the question of how are services made tradeable. A typical definition of market exchange matches the exchange of property rights to the physical transfer of products in exchange for money (Hodgson, 1988). Hill’s (1977, p. 336) claims is that a “...service is produced by one economic unit for another, but it is not exchanged between them”

Hill (1999) follows up this trail and provides further clarification on the distinction between products and services. Products are regarded as entities whose existence is independent of their qualities or the relationships that brought them into being. Ownership is the right, conferred by law, custom or tradition to use or dispose of whatever is owned and to prevent others from doing so, if desired. The ability of products to be disentangled from relationships and capable of independent circulation makes them the ideal case for market exchange. By contrast, the outputs of services are not separate entities that exist independently of the relationship between producers and users.

Hill (1999) refines the institutional definition of services and uses the comparison of a subcontractor and an independent producer who makes components for sale. The component producer owns his output prior to selling it, can build up stocks of components and control the flow of his own output. The producer has to bear the capital cost of holding any inventories and run the risk of having unsold inventories, a situation which is impossible for a subcontractor or indeed service producers in general. The difference between purchasing a product through the component producer or a service through the subcontractor boils down to who controls the timing and location of production, who bears the capital costs and who assume the risks in this transaction. In summary, the distinction between products and services often depends more on economic factors that determine boundaries and areas of

responsibility in a producer-user interaction than on technical factors concerning the production process.

In Hill's schema, products are not just eminently tradeable but their independence from producer-user interactions allows a clear physical separation between production and exchange activities. As Demsetz (1993) remarked, products can be seen as embodying specialised knowledge in a way that is highly advantageous for promoting the division of labour. Products allow knowledge to be packaged in a way that makes knowledge transfer between firms inexpensive and practical since the instructions needed to use products do not require in-depth knowledge about how they are produced. Products thus act as a means of separating production from exchange and limiting user-producer interaction – users only have to be “instrumentally knowledgeable whilst substantively ignorant” about the products they purchase, to use Loasby's (1998, p. 169) felicitous expression.

Delaunay and Gadrey (1987) and Gadrey (2000) develop Hill's definition by positing that a service activity is an operation intended to bring about a change in the status in a reality C that is owned by consumer B effected by service provider A at the request of B and in many cases in collaboration with B, without leading to the production of a entity that can circulate independently of medium C - circulation understood here as the transfer or property rights rather than circulation in space. Gadrey et al (1995) define the production of a service to organise a solution for a problem that does not principally involve supplying a good. The most interesting aspect of this definition is that products are seen as the limiting case of services – when no independent output to which property rights can be attached independent of the relationship between A and B.

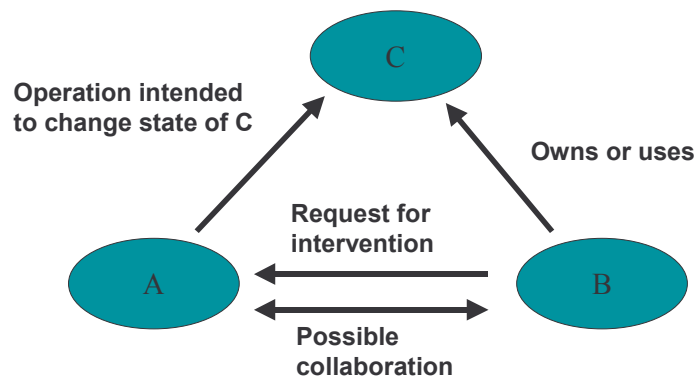


Figure 1 (after Delaunay and Gadrey, 1987)

Gadrey (2000) seizes upon Hill's two demand rationales for services, “assistance or intervention” and “the provision of maintained technical capacities that customers can avail themselves of in exchange for payment” to add a third rationale, “live performance”. These different rationales have direct implications for the types of customer-supplier interaction required and the relational as well as spatial proximity of these interactions. In the first and last cases, relational as well as spatial proximity is required whereas the second case does not imply relational or spatial proximity. For example, customers can avail themselves of a technical capacity through technologically mediated interactions at a distance (e.g. telephone lines, websites) and require no relational proximity.

Gadrey's three service logics evoke access to a socio-technical capacity embodied in specialised human competencies and technical apparatus. In the case of “request for assistance or intervention”, this socio-technical capacity consists of means for the performing

diagnostics, maintenance or repair to produce the desired effects on an object owned by the purchaser of the service. In the “access to maintained technical capacities” logic, this capacity may often be invisible to the user and may involve a complex logic of supply and access (e.g. Internet banking service provision). Under the “live performance” logic, this capacity is embodied in a complex set of scripts involving both human performances and material arrangements (e.g. the stage and seating in a theatre).

Hill and Gadrey’s contributions clarify the nature of services and places producer-user interaction at the centre of attempts to distinguish products and services. However, the notion that services cannot circulate as independent entities in a property rights space begs the question of what makes services tradeable at all. In addition, the product-service distinction relies too much on a clear-cut separation, institutionally and physically between production and exchange. For many products, as we highlighted earlier, there is a more intricate relationship between production and exchange and closer spatial as well as relational proximity between producers and users.

The tradeability of services: transfers and transactions

The issue of tradeability is often conflated with the transfer of property rights and tangibility. Tangible goods to which properties can be unequivocally attached provide the classical definition of market exchange (Hodgson, 1988). Production and exchange can be neatly separated in the case of tangible goods but that it is not the case in services since it is not possible to establish property rights over a service and transfer ownership from one economic unit to another. This characteristic accounts for the inherent difficulties in making services tradeable.

Baldwin and Clark (2003) adopt an engineering systems approach to defining where transactions should be located in a complex production system. The driver for defining transaction loci is the notion of mundane transaction costs or the costs of defining what is to be transferred, of counting the transfers and of valuing and paying for the transfers. At some points in the system, transfers are simple, and therefore *easy* to standardise, *easy* to count and *easy* to value. At other places, transfers are complex, hence *impossible* to standardise, *impossible* to count, and *impossible* to value. Objects that are transacted must be standardised and counted to the mutual satisfaction of the parties involved. In addition there must be a backward compensatory transfer – paid by the buyer to the seller, akin to the definition used for Hodgson (1988) for market exchange.

At first sight, only products seem to be tradeable according to Baldwin and Clarke’s definition of transactions. In their analysis of a more complex transaction between two enterprises, where specifications could not easily be translated into product characteristics, Baldwin and Clarke (2003) contend that the two parties had to become locally and temporally de-encapsulated with respect to the specification issue. In their terms, buyer and supplier had to allow a whole set of material, energy and information transfer to occur across their boundaries, which were uncounted, unstandardised and uncompensated. The implication appears to be that product-based transactions may involve a whole series of service-based exchanges that resemble intra-firm transfers and are inherently difficult to transact.

Penrose (1959) seminal distinction between resources and the productive services they render provides a good platform for the following discussion. As Penrose (1959, p. 25) reminds us:

“The important distinction between resources and services is not their relative durability: rather it lies in the fact that resources consist of a bundle of potential services and can, for the most part, be defined independently of their use, while services cannot be so defined, the very word ‘service’ implying a function, an activity”.

As Penrose (1959, pp. 74-75) remarks, it is the heterogeneity rather than the homogeneity of both human and material productive services that makes firms unique:

“Productive services are not “man-hours”, or “machine-hours” or “bales of cotton” or “tons of coal”, but the actual services rendered by the men, machines, cotton or coal in the productive process. Although it is manifestly services that in this sense that are the actual (physical) “inputs” in production, a less specific or more indirect definition is usually required when services must be expressed as measurable homogeneous *quantities*, for example, if it

desired to measure the cost of certain productive services or to construct technological production functions for certain outputs”

This is – at least in part – the problem identified by Baldwin and Clark (2003): to make a transfer into a transaction, there is a need to standardise, count, and compensate. It is worth pointing out that these internal pinch points have no “natural” place in a sequence of activities, any more than inter-organisational ones do. Indeed, deciding where pinch points should be is fundamental to the challenge of process design in operations management, and in the implementation of such organisational innovations as Just-in-Time (JIT) and Business Process Re-engineering (BPR), which have sought to reduce their number.

The above discussion highlights some of the problems associated with understanding what makes products and services tradeable. On one hand, Baldwin and Clark’s (2003) distinction between transfers and transactions highlights the importance of standardising, counting and valuing objects of exchange. There is a Coasean story of attempting to understand institutional structures of production through aggregating activities into larger modules through transactional interfaces. When these interfaces can be made to work, markets take over and when they do not, activities are simply aggregated into larger non-modular structures (Langlois, 2002).

In short, tradeability is associated with the ability to define and attach property rights to tangible, material entities at pinch points in production systems where mundane transaction costs are low. But, as Callon and Muniesa (2002) stress, materiality and physicality or tangibility should not be confused. Services can be made tradeable by defining, delimiting and standardising their content – they can be made to have “objectified properties” and thus become fit for the attachment and transfer of property rights. A car rental for example, defines a period of usage of a car according to a well-defined script of rules and conditions. In this sense, a car rental can be made tradeable in Baldwin and Clarke’s terms as much as the sale of the car itself. The expansion of trade in services is often the result of defining new conditions of access to socio-technical capacities (e.g. renting admission to a facility, mobile phone text alerts). Lovelock and Gummesson (2004) identify forms of non-ownership such as rental, hire and lease as a springboard for understanding the growth in service offerings. Thus the connection between tradeability, tangibility and service-product distinctions raises broader issues concerning transactions and markets.

Callon et al (2002) sidestep this discussion by focusing on the notion of goods, a concept not be used interchangeably with a product. A good implies a stabilisation of characteristics at the moment an entity, product or service, is ready to be traded. A product is an economic good that can be seen from a variety of perspectives: production, circulation and use. Thus a product corresponds to a process, a trajectory in time whereas a good corresponds to a state at a point in time.

Callon (1991, p. 136) had earlier defined products as programmes of action aimed at coordinating a network of distributed roles. The definition of what a product is, implies a definition of the socio-technical context it will inhabit which should include the roles played by other objects (e.g. power supplies) as well as different types of human actors (e.g. users, after-sales service people). Products can thus be seen as texts embodying specific programmes of action, inserting themselves in particular networks of skills (e.g. what skills do users need to make the product work, what skills do repair people require to diagnose malfunctions). At the same time, products are themselves accompanied by a variety of texts as they move from production, circulation and use (e.g. logbooks, user manuals, warranty documents). In short, products do not just circulate as independent intermediaries in pre-established networks but define and describe network of actors connected to their design, production and use (Callon et al, 2002).

A product’s biography can be traced within these networks. A car, for example, moves from the designer’s office to prototype stage and test tracks, to one of many assemblies in a production line, to an item in a manufacturer’s brochure with particular specifications, to depots and dealership showrooms. Once in the hands of its first registered owner, it follows another trajectory, of clocking miles on public roads, of regular service in maintenance workshops, to used car magazines and dealers and finally, to scrap and recycling yards. The same product can thus have a rich and multifaceted biography and constitute a different good at different stages of its life-cycle (e.g. when it is sold new or second-hand).

Service provision as Gadrey (2000) noted, involves the mobilisation and deployment of different forms of socio-technical capacities. Making services tradeable, as Callon and

Muniesa (2002) remark, is a process of defining boundaries around access to maintained socio-technical capacities, of objectifying what is to be exchanged and of elaborating scripts that govern access to socio-technical capacities. Callon (2002) characterises the standardisation of service provision and service interactions through what he calls “writing devices” – e.g. texts that objectify the elements of service provision through comprehensive descriptions. Using the example of boat trips in the Seine, Callon illustrates how in Gadrey’s logic of performance situations, continuous writing and rewriting of scripts define service content. Some of these texts were paradoxically described as “product files”, highlighting how the process of objectification of a service in common language imperceptibly slips into a “product-based” discourse.

None of the above arguments invalidates Hill’s notion that one cannot attach property rights to services and make them circulate independently of the relationship between provider and user. But it highlights the spurious association between tangibility, property rights and tradeability. As long as services can be bounded, objectified, clearly specified and scripted into socio-technical capacities they can be transacted just as easily as products.

A number of implications follow from the above discussion. First, the institutional definition of services favoured by Hill poses interesting issues related to how services can be made tradeable. For example, in industrial markets customers can avail themselves of technical capacities before and after product exchanges that may be difficult to disentangle and value independently from product transactions. In other words, we are still in the presence of services but services that have not been disentangled from product transactions and objectified as bounded entities. Conversely, firms may adopt transfer pricing policies (e.g. based on activity based costing) to standardise, count and compensate the provision of services in internal customer-supplier relationships, a favourite theme of total quality management (TQM) and cellular manufacturing. In both cases, we are in the presence of services that are not the subject of market-based transactions even though in the latter case they can be accounted for as intra-firm transactions through transfer pricing mechanisms for example.

A second issue concerns the difficulty of defining products and services independently from forms of economic coordination in particular producer-user interactions. As Baldwin and Clarke’s (2003) imply, market-based transactions conform neatly to the thinnest of interfaces between buyer and seller. Transfers that score low on standardisation, low on ease of counting and valuing belong to the realm of hierarchies and relational contracting. By implication, services should be seen mainly as transfers and thus fall either within relational contracting or hierarchy. But, as we have argued, this is a difficult argument to sustain. Transaction points do not emerge naturally where products cross thin buyer-supplier interfaces. Many transactions are embedded in complex buyer-supplier relationships with multiple product and service exchanges. The task of making services objectified and bounded entities that can be transacted is not necessarily an easy one, but is one that is routinely achieved. Baldwin and Clarke’s implicit suggestion that services fall by default into the category of uncounted, unstandardised and uncompensated transfers should be tempered by Callon et al’s (2002) notion that specialised work is required to accomplish transactions in the case of products as well as services. Both cases require the objectification and stabilisation of what it is that is being transacted – or in Callon et al’s (2002) terms, both products and services need to be turned into goods.

Manufacturing Moves into Services

In an early example of studies of services in industrial markets, Cunningham and Roberts (1974) remarked that a service is either central to a transaction or it is supplied in conjunction with a product. When a service is bundled with a product, it is either addressed at reducing the workload of the buyer in making the purchase, to reduce the uncertainty associated with the purchase or to increase the usefulness and availability of the product. Håkansson (1980) characterise buyer-supplier relationships in terms of problem-solving and transfer, to denote the range of services involved in finding a solution to an identified need and to transfer the solution to the customer’s setting. The emphasis is on the interaction between two parties that co-participate in the development of the solution and its transfer. Mattson (1973) and Page and Simpienski (1983) used the term systems selling and marketing to refer to integrated solutions of hardware and software, products and services that can in principle be marketed separately.

The upshot of these early examples is that services are always involved in complex buyer-supplier relationships whether they are accounted for as a separate part of a transaction or they are bundled in with products. More recently, in a number of manufacturing sectors erstwhile manufacturers have been forward integrating into systems assembly and supply and the provision of value-added services. Manufacturing has increasingly been seen as an ever-narrower stage of a value-added chain where most profit opportunities reside upstream and downstream of actual manufacturing or what Pavitt (2003, p. 88) called the "...skilled activities that manufacturing firms undertake except manufacturing itself".

Chase and Garvin (1989) were amongst the first to extol the virtues of broadening the scope of factory work to include activities normally delegated to other functions such as helping customers with making products work on site and maintenance. Wise and Baumgartner (1999) note that in many industries the installed base of products has been expanding steadily due to the accumulation of past sales as well as longer product life spans. The proportion of new sales versus the installed base has pushed manufacturers downstream away from manufacturing new products and towards services required to operate and maintain the installed base. The strategic implication of this shift is clear: manufacturers that ignore opportunities for forward integration will see their profits erode, as more value flows downstream and away from manufacturing. A number of other publications have been concerned with the implementation of service strategies in traditional manufacturing sectors (e.g. Bowen et al, 1989; Mathieu, 2001).

Davies (2003) argues that rather than just adding services to existing products, firms are changing their strategies, occupying new positions in value chains and developing systems integration capabilities. The argument is that the trend towards outsourcing and vertical disintegration has led to the emergence of a new type of specialist firm, the systems integrator. Systems integrators focus on the specialist capabilities required to develop and design complex product architectures as well as the capabilities required to interact with and coordinate a network of external suppliers.

Contrary to Wise and Baumgartner's view that opportunities lie downstream from manufacturing, Davies argues that many services are offered before and during the making of the product. Within these services, Davies (2003, p. 340) includes pre-bid negotiations, the bid to contract phase, and the project implementation phase including the detailed design, integration and testing as well as handover to the customer.

The much heralded move of manufacturing into upstream and downstream services may thus have little to do with new activities in value systems. Instead, we should be focusing on two other phenomena that may explain this trend. On one hand, the increasing disaggregation of value systems into more complex patterns of relationships amongst specialised producers and service providers. At one level, this simply shifts internal transfers into transactions in Baldwin and Clark's language.

On the other hand, the task of designing new services in the shape of new forms of access to maintained technical capacities provides firms with opportunities to broaden their offering and increase revenue streams often from the same customer base. For example, water utilities use the technical capacities to maintain and repair their infrastructure to design plumbing insurance services for households. Finally, the constant stream of product innovations may create temporary disparities between producer and user capabilities that can be exploited by a variety of service providers aiming to bridge that gap.

As far as the first trend is concerned, as Pavitt (2003) reminds us, processes of technological convergence and vertical disintegration have been at work for a while in a number of industries. The end result is not just the disaggregation of value chains but also the emergence of specialised firms providing products and services across a broad range of industries. The drivers for this process must be understood with reference to the division of labour and increasing returns.

A recent example is provided by the growth of contract manufacturing in electronics (Sturgeon, 2002). In this field, pressures of market volatility and increased international competition coupled with growing outsourcing have led to a distinctive model of industrial organisation, Sturgeon (2002, p. 455) calls the modular production network because "...distinct breaks in the value chain tend to form at points where information regarding product specifications can be highly formalised.[...] The locus of these value chain break points appear to be largely determined by technical factors, especially the open and de facto standards that determine the protocol for the hand-off of codified specifications."

For Pavitt (2003) both modularity and advances in information and communication technologies have contributed to the disaggregation of product design and manufacturing in a number of industries even though there are limits to these trends. The end result is the migration of manufacturing to far flung places but the retention of highly skilled services in high wage countries. These services comprise such diverse activities as high tech machines processing information rather than materials, knowledge underlying manufacturing activities, capabilities for designing, integrating and supporting complex physical systems and logistics operations. As Pavitt (2003, p. 88) remarks: "The fact that some of these activities are defined as "services" often confuses rather than clarifies".

The second major trend has to do with the increasing number of firms that are disaggregating their structures and multiplying the number of services they provide through access to new forms of socio-technical capacities. Zenger and Hesterly (1997) provide an argument as to how internal initiatives and innovation in performance measurement enhance a firm's capacity to circumscribe and isolate internal activities. Recent innovations in performance measurement both financial and non-financial such as benchmarking, quality measures, and activity based costing provide firms with more accurate, fine-grained measures of subunit performance. In turn, the increased accuracy of cost measurement at the subunit level, aids the internal disaggregation of firms and the generation of new sources of external services. For example, with accurate cost drivers in place, activity centres can be benchmarked against external suppliers and highly efficient units may be encouraged or required to provide external services. In summary, the disaggregation of large firms and the infusion of market based incentives into hierarchies are improving the ability of firms to isolate specific socio-technical capacities which can be used to provide internal as well as external services.

This example poses a further challenge to the model advanced by Baldwin and Clarke (2003) regarding clear-cut distinctions between transactions and transfers. In effect, the disaggregation of large firms and the injection of market-based incentives into hierarchies blur the distinctions between transactions and transfers – as Zenger and Hesterly (1997, p. 216) note "...for many inter-unit exchanges, the formal legal distinction has become the *only* difference between market and hierarchical governance".

Finally the proliferation of new products, as Langlois and Cosgel (1999) argue, do not necessarily determine clear boundaries between producers and users nor do these products constitute the successful disembedding of services from user-producer interactions. We can think of situations where the routines and capabilities of producers and users cannot link up through the use of the thin interfaces that Demsetz (1993) idealised for market transactions – i.e. a simple manual of instructions would be all that users would require to integrate their new purchases in their consumption routines.

In these circumstances there are entrepreneurial, service-based opportunities to provide a bridge between the capabilities of producers and users. Consultants may provide that function in terms of helping users specify their needs and seek solutions to those needs. It is also possible that producers may bundle services with products in situations where the connection of the capabilities embodied in the product and the context of usage of the product are not immediately apparent to users. In more extreme examples, as Langlois (1992) illustrates, knowledgeable consumers may even undertake production roles as in the case of enthusiastic hobbyists in the early stages of the personal compute industry.

In summary, the growth in services associated with manufacturing cannot be associated with a logic of substitution but is connected to the constant reorganisation of the institutional structures of production. As we have seen, trends towards the disaggregation of value chains and finer partitioning of activities, the fragmentation of corporate structures and the proliferation of innovations all provide entrepreneurial opportunities for service provision.

Conclusions

This paper has revisited the nature of product-service distinctions and attempted to shed new light on the growth of services associated with manufacturing. Our dissatisfaction with the existing literature is centred on the spurious association of tangibility and tradeability and the lack of attention given to the institutional structure of production.

We concur with Gadrey's (2000, p. 386) remark that it is unlikely we will ever arrive at a definitive list of factors distinguishing products from services. Indeed, we go further and suggest that such quest is both unproductive and distracting. Instead, we suggest that products and services constitute different types of intermediaries and both require stabilisation and objectification to be transacted as Callon et al (2002) have argued. The "objectification" of an entity doesn't require that its properties are inscribed into tangible, solid materials even though many services rely on a significant array of tangible resources as the literature on services marketing has long since stressed (Levitt, 1972). The tradeability of a service simply requires that its properties are objectified, stabilised and delimited. In summary, as Hill (1977, 1999) and Gadrey (2000) argued, making services tradeable requires the regulation of access to maintained socio-technical capacities which may involve a variety of modes of interaction between service providers and users. In some cases, relational and spatial proximity will be required whereas in many others, this access can take place without either.

If it is not straightforward to see how intangible services can be made tradeable, looking at products as more than autonomous entities is equally counter-intuitive. Our suggestion, following Callon (1991), is that products constitute programmes of action inscribed in physical, tangible materials. But it would be wrong to see products as simple embodiments of knowledge and vehicles for disembedding services from the vagaries of producer-user interactions. The production, circulation and use of products define particular networks and allocate roles to participants in those networks as Callon et al (2002) suggest. Hill's (1977) suggestion that products should be regarded as entities whose existence is independent of their qualities or the relationships that brought them into being, needs to be corrected. The production, circulation and use of products should not be separated from a range of services normally associated with those activities.

The implications of our views can be seen at three levels. First, rather than focus on intrinsic distinctions between products and services and attempt to derive implications from these for the management of product or service based firms, we should focus on products and services can be both complements and substitutes for each other. The suggested focus on mixed offerings of product-service combinations employed in Ford et al (2003) is a helpful start to overcome the service-product dualism. The business challenge for most firms is how to generate a variety of revenue streams from both product and service transactions, as the recent literature on expanding the role of manufacturing suggests. However, we argue that these suggested moves often entail significant costs in terms of creating new services in terms of new forms of access to maintained socio-technical capacities and new organisational arrangements to support these services.

Secondly, the relentless focus the service-product distinction has detracted from a closer examination of the different categories of services and their impact on purchasing, marketing and operations decisions. Most of the work on categorising services has been performed from a national accounts perspective and a concern with better understanding of the rise of the service economy (Delaunay and Gadrey, 1987). Although there are recent examples at attempts to categorise services from a business perspective (Axelsson and Wynstra, 2002), much work remains to be done here. Gadrey's (2000) three service logics provides one helpful starting point to look more closely at this issue and extract useful business implications for organising and managing service provision.

Lastly, a more encompassing definition of services, a richer distinction amongst different types of services and a better understanding of service-product hybrids provides a richer opportunity to tackle the issue of innovation in services. As we have suggested, innovation of services often involves not just access to new capabilities but the reorganisation of existing sets of capabilities and the provision of new modes of access to capabilities by service providers. The connection between service provision and corporate structures is particularly illuminating. Corporate fragmentation and restructuring often provides new opportunities to define, delimit and market new services. Conversely, innovation in service provision is almost

always accompanied by the design and development of new organisational designs, as Gadrey et al (1995) suggest.

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