

Studies on Innovation Matters Related to the Implementation
of the Community 'Innovation and SMEs Programme'

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Innovation in Services: Issues at Stake and Trends

A study co-ordinated by

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We would like to emphasise that the views expressed in the report are those of the authors and do not necessarily reflect the views of the European Commission or that of our research partners or collaborators.

Executive Summary

This is the Final Report produced by the Manchester coordinating team under Lot 3 of the Inno Studies Programme (ENTR-C/2001).

Study Background

1. The service sector has a dominant role in developed economies, accounting for roughly two thirds of employment and GDP. More particularly, services have been the only sector of the European economy that has generated jobs in the last two decades (Chapter 1).
2. The growing significance of services in the overall economy is also reflected in its increasing innovative activity, with services accounting for a greater share of overall R&D activity, patenting and trademark activity. Thus, by 2001, the European Union average for the share of services in Business Expenditure in Research and Development (BERD) had risen to 13%, although for some EU countries, such as Spain and Denmark, this was much higher at over 30% (Chapter 1).
3. The study analysed the data of three key surveys which have relevance for the study of innovation in services, namely: the Innobarometer survey and the second European Community Innovation Survey (CIS-2) and the 'Four Sectors' survey, which was undertaken specifically for this project.
4. There are significant sectoral differences within services in terms of the activities they undertake and in the nature and extent of innovative activity. In order to overcome this great diversity in service activities, a fourfold typology of different service activities and conditions was used based on the different transformation processes: those services engaged in physical transformation processes (particularly of goods); those services involved in the transformation of information; those services engaged in the provision of knowledge-based services; and, those services which are aimed at the transformation of people (Chapter 4). The study in order to recognise the diversity of operating and market conditions of these four broad service activities, selected in turn four specific service sectors to represent them, namely: road transport and logistics; information processing (particularly call centre) activities; design and related activities; and, care for the elderly.

Main Findings I: Extent and Pattern of Innovation

5. In relation to the Innobarometer survey, it was revealed that a majority of firms surveyed in service sectors in 2002, did consider themselves as being involved in some form of innovative activity. The main difference was in the importance service firms placed on non-technological, organisational innovation compared with manufacturing firms (Chapter 2).
6. On the basis of CIS-2 data, collected for the period 1994-1996, a significant (over a third) proportion of service firms western European countries, were innovative

in that they introduced new services or methods to produce or develop new services (Chapter 3). The review of the CIS-2 data also revealed the diversity in the behaviour of service firms with respect to innovation not only between sectors but also within them. As such, there is considerable variety amongst 'innovating service firms' that is not wholly explained by the nature of the particular sectors in which they operate.

7. The 'Four Sectors' survey of service businesses also recorded a significant level of innovative activity.

Main Findings II: Drivers of Innovation

8. The results identified a fairly close link between traditional, direct forms of innovation ('CIS type') with more indirect, disembodied forms of innovation ('Non-CIS type') in those businesses that recorded such change. Nonetheless, there was a large and significant group of businesses in both Europe and America which are involved in a significant way with more indirect, disembodied and intangible forms of innovation, that have little or no involvement in the more traditional, direct forms ('CIS type') of innovation.
9. All E.U. businesses rated quality of services provided as the most important factor contributing to business success (with an overall average score of 96%), whereas relatively few sought to compete mainly on cost.
10. The analysis found, as expected, that as organisations become larger, they are more likely to innovate.
11. European record a much more positive view about their level of innovativeness than U.S. firms. There are variety of reasons for this explanation, but one which is worth further exploration is that there is a difference in the strategies of firms between the US and Europe. Because the costs of establishing a business tend to be less in the US, it is possible that US firms tend to emphasise 'fitness' rather than 'adaptability'. 'Fit organisations' concentrate on doing an established set of activities and improving their performance at those activities. The pattern of improvement tends to be cumulative, and individual advances (or innovations) may not be recognised. By contrast, 'adaptable organisations' are those that retain a greater ability to change into a different set of activities. These change tends to be more discontinuous, and therefore more recognisable than continuous improvements. However, it was also acknowledged in the main text that, since the survey concentrated on 'change', there could be the issue of 'catch-up' by European businesses in terms of their record and attitude towards innovation.
12. As expected, those businesses seeking substantial growth were more likely to engage in almost all types of innovation. It is notable that for each type of innovation, those organisations seeking substantial growth greater levels of innovativeness than that for those seeking modest growth.
13. The wider the geographical market that the businesses served the study found the greater likelihood that it would engage in all types of innovative activity.

14. There is evidence from the survey that beyond a fairly low threshold, the number of competitors does not have an especially important (direct) relationship with innovation. Indeed, the quality of competition is rather more important than the quantity of competition. Moreover, there are a few hints that a large quantity of competition can have a negative impact on innovation performance. As such, it is not the quantity, but the quality of competition that matters, plus how firms respond to the task environment they perceive.

Main Findings III: Barriers to Innovation

15. There was significant sectoral variation within services in terms of what is seen as significant barriers to innovation. Care should therefore be taken in making 'blanket' statements about service innovation barriers and policies to rectify them.
16. On a broad level, there was indication from this survey that *external* conditioning factors seem to be seen as more significant barriers to firm innovation than internal barriers, associated with, for example, the lack of qualified personnel and organisational rigidities.
17. However, the most significant of these external barriers were not so much to do with government action (such as regulation) or in-action (such as lack of support), but rather with customers being unwilling or unable to pay for new services and the costs and risks of innovation. These first and second rated barriers were also associated with the fifth rated barrier, that customers are unresponsive to new services once they are introduced. The lack of demanding and novelty seeking customers, who are willing and able to pay for upgraded, improved or novel services, seems to be a major and highly important barrier in service innovation which enterprises find difficult to overcome. There is clearly a role for public procurement in helping to energise the demand side of service innovation.
18. Regulation was rated as being the third most significant barrier hindering innovation, with it being of particular significance in the care for the elderly and road transport sectors. There is clearly an issue of over-regulation here, but on the positive side regulations can also stimulate innovative activity and greater efficiency (Chapter 8).
17. Lack of key staff was not rated highly, except for care for the elderly, and this contrasts with other studies which suggest human resource and training issues could be a significant barrier to innovation in service sectors.
18. Across the three sectors where comparisons are provided (road transport, information processing and design and related activities), E.U. businesses tended to rate barriers as being much more significant than their U.S. counterparts. This might indicate that E.U. respondents complain more or are generally more pessimistic in their attitude. However it could also point to more fundamental issues associated with the nature of the 'task environment' they operate in, one which is too restrictive or nurturing enough to grow and develop in.

Policy Issues

19. Turning now to policy matters, insight into services and service innovation, and in turn policy formation, is still hampered by the lack of adequate basic statistics on services and service industries, which is a prerequisite for policy formulation, monitoring and evaluation.
20. Innovation statistics are still strongly biased to technological innovation, and measurement of output and factor and knowledge inputs in services is one of the key areas where initiatives are needed both within member states, but also on a European-wide and international level. This study, for example, has sought to compare some of the conditions of service innovation between the European Union and the United States, but has been hampered, amongst other things, by comparability of datasets. There have been important steps by the Community Innovation Survey to include non-technological innovation indicators in their survey, but more effort is still required.
21. However it is important to recognise that services are difficult to study and conceptualise. It is, therefore, not just about 'simply' putting more money into funding the collection of more data and the creation of new and more comprehensive datasets. Much more effort needs to be done by the research community in developing new, but robust indicators, particularly in the area of organisational innovation, that can actually better articulate and measure what service innovation is about and not simply trying to adapt old modes of thinking in relation to innovation. This will require basic, long term funding in developing this conceptual and methodological research framework.
22. This all suggests that broad and homogenous training and skills based outside the firm will not be as effective in supporting service firms to be both more competitive and innovative as other more tailored schemes. Based on this review, training and skills support should be more specific, centred on the: peculiar needs of the sectors; the skills required; provided generally in-house; and, centred more on bespoke provision relating to the particular needs of the firm.
23. The implications for policy are less clear cut in relation to human resources and training. The issue of human resources obviously raises the question of the division of responsibility between the state and the enterprise in the provision of an educated, skilled and motivated workforce. There was some evidence to suggest that firms that identified human resources as a problem were more likely to engage in training, but this 'self-help' approach to the problem did not go far - about two days per employee. Policy needs to promote and stimulate the benefits of training and higher skills levels to service firms, but also needs to consider how such support might be approached. Here the evidence is much clearer. Relatively few firms thought that training should be provided by the public sector's education and training institutions, with a strong indication that the majority of firms thought the training to improve the qualifications of staff should be provided by the companies themselves.
24. In relation to intellectual property rights and policy, the European Commission needs to carefully monitor the situation. Firstly, for certain service sectors, such

as telecommunication services or computer services, intellectual property right issues are important and businesses in these sectors do feel that often existing property right mechanisms are not properly aligned to the needs of the firms concerned. There have been some shifts in the reach and nature of certain mechanisms such as the extension of patents to cover certain forms of software generation, but problems remain for firms operating in these knowledge intensive and high technology service sectors.

25. As all forms of services become more knowledge and innovation intensive, more service firms may be encountering problems surrounding intellectual property rights and the protection of knowledge surrounding aspects of the innovation process. As yet, this still may be of a low level, but given the general trends towards increasing levels of innovation may become more pervasive over time.
26. Despite the positive role of regulation it also does form a significant barrier hindering innovation, particularly in certain sectors. We may need new and novel regulation in certain areas, but we need continued vigilance in reviewing and reducing *regulatory burden* in other areas. Regulation should not always be seen negatively in a European context, but equally it does form a burden to service industry which hinders innovation.
27. The study concludes by listing a number of specific policy suggestions designed to support service innovation in Europe (Chapter 8).

1. Introduction

1.1 Why Services Matter and Are they Innovative?

The service sector has a dominant role in the developed economies, accounting for about two thirds of employment and GDP (Eurostat, 1999). According to Eurostat, “Services are the only sector of the European economy that has generated jobs in the last two decades.” Thus, between 1985 and 1997 approximately two-thirds of economic and employment growth in the business sector of Organisation for Economic Cooperation and Development (OECD) countries was due to growth in services. On average, value added created by business-related services constituted 54% of the total in 2001, compared with 34% for manufacturing industry (Commission of the European Communities 2003, 11). More specifically, knowledge-based ‘market’ services accounted for 19% of total OECD value added in 2000 (OECD 2004, 48). In the United States of America (USA) alone, 76 million jobs were created between 1970 and 2000, with 70.6 million (93%) of these jobs in services (quoted in Beyers 2003, 3).

Services, therefore, not only comprise a large part of the economy, but also represent the main engine for growth within advanced industrial economies. However, despite this, little is known about the underlying dynamics and nature of the service sector compared with other sectors, such as manufacturing, mining and agriculture. What makes services such a dynamic growth sector in developed economies? How can it be stimulated and sustained in the future? What is the role of innovation in this process of dynamic change?

The report seeks to provide some answers to these issues, but also seeks to challenge some of our traditional assumptions about services and innovation. It argues that innovation in service activity remains a hidden dimension to its growth and success and that, moreover, service innovation plays an increasing role across the economy, stimulating change and supporting growth.

Certainly services have long been perceived as being non-innovative or technologically backward. Until the 1990s they were largely perceived as passive adopters of technologies developed by manufacturers. Throughout the 1990s and into the 21st century, it has become increasingly clear that this view is, at best, an oversimplification. Services are certainly major users of technologies, not least information and communication technologies (ICTs), but they often use these in creative rather than standard ways, and their needs for new functionality is a major stimulus to innovation by manufacturers and software creators alike. Even as users of technologies, therefore, services can be significant innovators.

Services are, however, not just innovators through the use of acquired technologies. The service sector is becoming an ever more important locus for innovative activity within the emerging ‘knowledge economy’. ‘Knowledge Intensive Business Services’ (KIBS), such as those involved in market research, design, engineering and technical services, are particularly important economic actors, and these services are increasingly becoming more proactive, generators of innovation, which are taken up and implemented by manufacturing enterprises. The British company ARM plc is a good example of this.

ARM designs, but does not manufacture, the computer chips that are at the heart of the vast majority of mobile phones sold the world over. This growing significance in innovative activity within services is reflected in the increasing share of services in overall R&D activity and patenting and trademark activity. In 2001, the European Union average for the share of services in Business Expenditure in Research and Development (BERD) had risen to 13% (Commission of the European Communities 2003, 21), although for some EU countries this was much higher.¹ Studies using Community Innovation Survey (CIS) data have also shown that service activities are also generating more innovations (Chapter 3). Thus no longer can *all* service firms be regarded simply as passive consumers of technology or mere facilitators to manufacturing companies, where manufacturers are seen as the 'real innovators'.

It is also apparent that there is tremendous diversity amongst services, in their activities and innovation strategies. Some of the world's most knowledge intensive firms are involved in services, but not all services are knowledge intensive. Many services are highly routine, and employ people with low, rather than high, levels of educational attainment. However, innovation and technological change affects these services too. For example, telephone call centres, whereby customers use centralised telephone-based centres to gain access to services, have grown massively in recent years. According to one estimate, one percent of the UK workforce works in call centres, a proportion that has been rising rapidly. Telephone call centres, together with other back office business operations, are an organisational innovation that has been facilitated by technological change and call centres have, for example, transformed the UK insurance industry. However, further technological change also threatens these activities. On the one hand, there is the prospect of internationalisation. Already call centres have been established in India and elsewhere in the Third World – where labour is cheaper - to service the European markets. On the other, there is the threat of further technological change. For example, it is now possible for customers to directly supply the information required for insurance quotations over the internet. Through this 'self-service' (one of the most profound and diffused innovation trends in services) the need for call centre staff is reduced and thus jobs only recently created are now being threatened.

In considering innovation in services it is therefore necessary to examine the full spectrum of service activities. All too often attention is restricted to the knowledge-insensitive 'high end', associated with KIBS and similar knowledge or technically oriented activities. Arguably, at least, as much attention should be focused on the 'low end', covering more routine services (such as retailing and distribution) which may not appear to be technologically dynamic, but which are nonetheless profoundly affected by technological and organisational change. It is also important to appreciate that it is these 'lower end' services that engage the vast majority of people employed in services.

Although services are increasingly seen as the drivers rather than the facilitators in economic growth, and some services have become integral to the growth of the knowledge-driven economy, services and their innovation activities remain poorly understood. This lack of understanding is due to a variety of inter-linked factors. The dominant conceptual models of innovation have been hidebound by manufacturing-centric views of the innovation process, centred as these are on the production of

¹ In Spain and Denmark the share was around 35% and 34% in the US. The share of services R&D as a percentage of total R&D in the OECD area has continued to rise from less than 5% of BERD in 1980 to 15% in 1997 (Howells 2001).

tangible artefacts. Innovation statistics, including those generated by the European Community Innovation Surveys (Chapter 3), have continued to reflect this production based (i.e., ‘technological product and process’) view of the innovation process.

There have been various attempts to define service innovations and what makes them distinct from innovation in manufacturing. Although many of the earlier studies tended to take a ‘technologist’ approach, focusing on the introduction of artefact, hardware-driven technologies and systems into service firms and organisations, more recent studies have sought to highlight the distinctiveness of service innovation. These ‘service-oriented’ approaches have sought to move away from what might be seen as merely adapting manufacturing based innovation models centred as these are on technological innovation. Instead, these new approaches have focused on the peculiarities of service innovation, revolving around non-technological, disembodied innovations, and how this might lead to new conceptualisations of innovation processes in relation to service activity. Latterly, more ‘integrative’ perspectives have sought to stress that service innovations include both technological and non-technological innovations, such as organisational and relational change, and such approaches seek to stress that human and organisational capabilities are also important in many service innovations (Van Ark et al., 2003). There is also a recognition of the convergence of goods and services in both their production and consumption (Howells, 2004a; 2004b). This also serves to highlight the fact that using existing approaches to identifying innovations, even service innovation by manufacturers is overlooked. With traditional innovation measures, the more disembodied and tacit forms of knowledge creation and innovation generation tend to be neglected, despite these being the very forms of innovation that tend to be particularly important in services, and especially amongst KIBS activities, but also in more routine services such as retailing and distribution.

Because service innovation has largely been overlooked by surveys, service innovation has in turn had ‘low visibility’. This has meant that academics and innovation policymakers alike have continued to neglect services as a policy field, and few funds have been provided to improve the understanding of innovative activity in the service sector. Even for this reason alone, the current study marks an important step forward. It represents a valuable opportunity to research, and provide policy relevant insights on, innovation in services. The study therefore aims to improve the insight into the innovative process within services, building on a number of studies that have been undertaken to emerge in this area, but also through the undertaking of original research.

1.2 Report Outline

We begin with an overview of innovation in services using two existing data-sets. In Chapter 2 we compare the extent and orientation of innovation in services and manufacturers across Europe using the Innobarometer survey. In Chapter 3 we draw on the second European Community Innovation Survey (CIS-2) and look primarily at patterns of innovation within services, highlighting in particular how these patterns vary within and between various service ‘sectors’.

In Chapters 4, 5 and 6 we report the results of the original research undertaken for this study. Chapter 4 introduces the four ‘sectors’ that were analysed for this study. These ‘sectors’ were: road transportation and logistics; information processing; care for the

elderly; and design. In Chapter 4, we provide an overview of these activities and outline, using case studies some of the innovations that have been introduced within them. Chapter 5 then presents the findings of the questionnaire survey which was undertaken for this study. The results pertaining to each of the sectors are outlined in turn. Chapter 6 then attempts to draw the evidence together, through the use of multivariate statistical methods, to examine the ‘drivers of innovation’ in services.

Chapter 7 looks at the empirical evidence concerning the factors hampering innovation in services. This chapter draws on evidence from the Innobarometer, the second European Community Innovation Survey, and the ‘Four Sector Survey’ which was undertaken for this project.

Chapter 8 concludes the report with a summary of the findings and an outline of policy related suggestions.

2. Innovation in Services and Manufacturing Evidence from the ‘Innobarometer’

2.1 Introduction

In this chapter, we examine the evidence on the extent and patterns of innovation in service firms, in comparison with manufacturers, as these were reported by managers in over 3,000 European firms to the ‘Innobarometer’ of 2002. The ‘Innobarometer’ was a telephone survey, undertaken for the European Commission by Gallup Europe during February 2002. The 3,014 European enterprises which participated all had 20 or more employees and the surveying was stratified: by country; by enterprise size (20-49 employees; 50-249 employees; and 250 or more employees), and by activity (construction, industry, services and trade).² The person interviewed was “the boss”, that is the person in charge of general management, or one of the highest level managers in a financial, marketing or commercial function.³

In contrast to the European Community Innovation Surveys (Chapter 3), the ‘Innobarometer’ is intended to be more of an ‘opinion poll’ than a scientific survey, and there is reason to believe that more innovative firms, or at least those firms that perceive themselves to be more innovative than the average, participated in the survey. Thus 60% of the respondents rated their company “above average” compared with their main competitors with respect to innovation performance (including 13% who declared their company to be “well above average”), whilst only 9% admitted they were “below average” (including 1% who declared they were “well below average”). The remainder either declared the firm was “average” (28%), or did not express a view (3%). There are two obvious explanations for these findings. Firstly, there may be an inherent bias in the participation of firms in the survey towards more innovative enterprises. This is understandable as it is a voluntary survey and so a firm that has engaged more fully with innovation would be more likely to be willing to discuss this with researchers than one that had avoided innovation. Secondly, there may be a level of self delusion amongst the respondents – quite simply they may think their firms are better at innovation than they really are.⁴

Given the above, we will examine the results of the Innobarometer as a simple sample, divided between two different activities: manufacturing and services. The manufacturing sector has been much more heavily studied with respect to innovation, and we include it here primarily as a benchmark against which to compare service firms. However, both

² This stratification generated 180 (15 x 3 x 4) cells, within which sampling was random. Because of the approach followed, larger enterprises and those in smaller European countries, were over sampled.

³ For further details, see ‘Flash Eurobarometer 129 – Innobarometer’, Gallup Europe, October 2002.

⁴ A third less likely and more complex explanation is that rather than focus on the firm’s overall innovation performance the respondents had in mind only the dimensions of innovation with which they engaged. For example, a firm may have focused on product innovation, whilst its competitors may have focused on process or organisational innovation. From the firm’s perspective it is reasonable to perceive that its innovation performance is superior to that of its competitors, particularly if it associates innovation primarily with product innovation. There may be further explanations, but it is impossible to disentangle these and overall we suggest that there is probably a bias in the response towards firms that are more active in innovation.

manufacturing and services are highly heterogeneous in the activities they cover. As analysed here, the ‘service sector’ includes firms engaged in: wholesale and retail trade, transport, communications, financial services, and various personal and business services.

2.2 Comparing Innovation in Services and Manufacturing

The Focus of Innovation Activities

We begin with the types of innovation activities the firms engaged in. The firms were asked about whether their innovation efforts were concentrated on: 1 – ‘the development of new products’; 2 – ‘the development of new production processes’; or 3 – ‘the development of new organizational changes’. A maximum of two of these could be identified. Amongst manufacturers, over half indicated their innovation efforts were concentrated on developing new products, and a similar proportion concentrated on developing new processes (Table 2.1). Meanwhile, a quarter of the manufacturers identified organisational changes. The patterns for services was different: 34% of service enterprises focused on developing new products, and 24% concentrated on developing new production processes, but over half (54%) claimed the focus of their innovation efforts was organisational change. This is a large and highly significant difference. Another notable difference is that a greater proportion of service firms were unable to identify the focus of their innovation efforts than were the manufacturers (12% compared with 5%).

Table 2.1 Innovation Type by Sector

	Manufacturing	Services	Statistically Significant Difference?
New Products	54%	34%	✓ (at 1%)
New Processes	56%	24%	✓ (at 1%)
Organizational Changes	25%	53%	✓ (at 1%)

Figure 2.1 shows these results in greater detail. The figure shows that over 70% of manufacturers focused their innovation efforts on developing new products and/or new processes (and not organisational changes), whilst only 8% failed to identify either of these and instead focused on organizational change alone. In services, by contrast, 35% identified new products and/or new production processes (and not organisational changes) as the main thrusts of their innovation activity, whilst 37% claimed to have focused on only on organisational change. Other surveys of innovation, most notably the European ‘Community Innovation Surveys’ (CIS) do not ask about organisational innovation, and this omission will clearly reduce the apparent innovation rate in services much more significantly than in manufacturing. It is therefore important that a methodology be developed to include organisational innovation in future versions of the Community Innovation Surveys.

Figure 2.1 Innovation Orientation by Sector

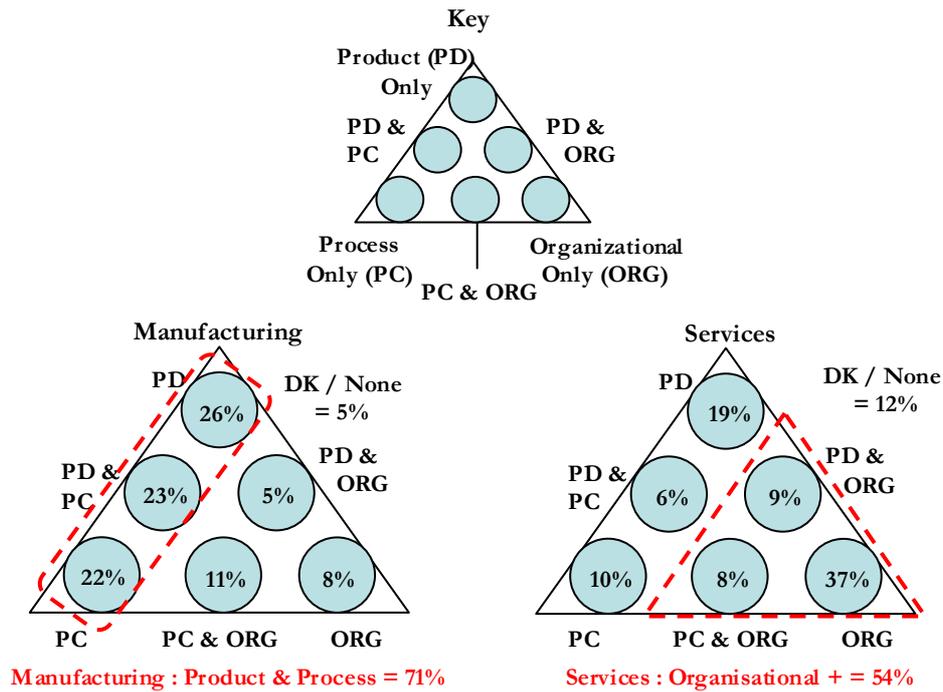
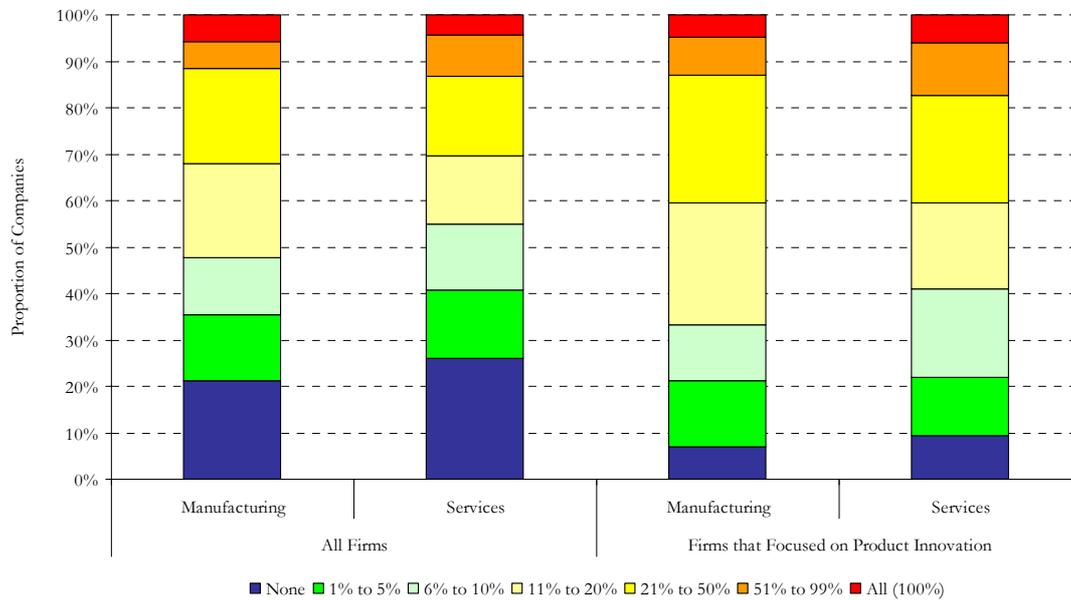


Figure 2.2 The Significance of New Products in Total Sales



The Contribution of Innovative Products to Sales

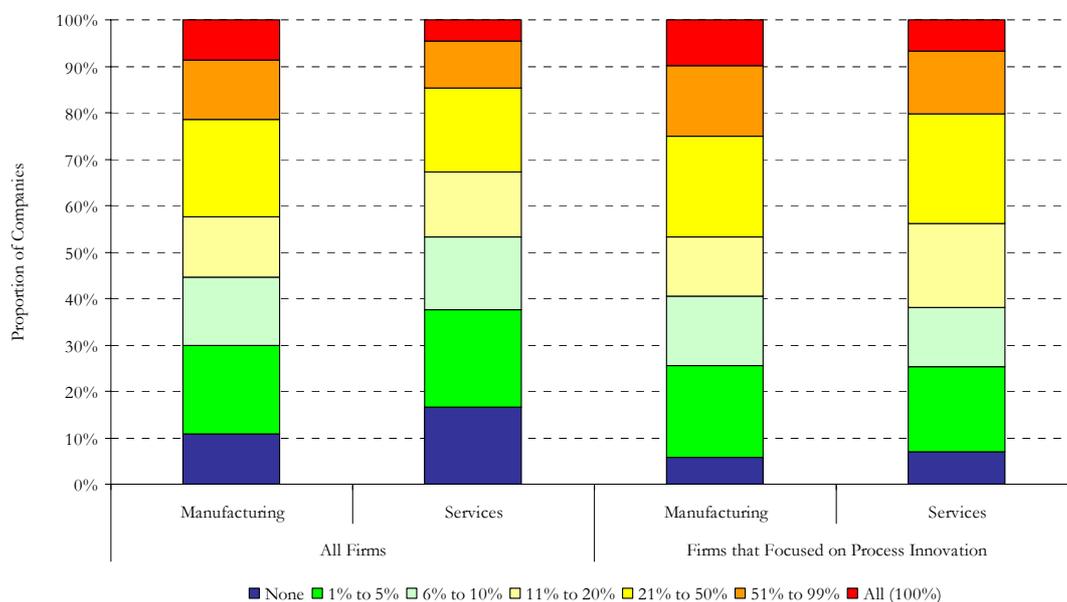
About 80% of manufacturers declared at least some of their income was derived from new or renewed products and services introduced over the last two years, but the proportion of service firms making this claim was only slightly lower, at about 75%

(Figure 2.2).⁵ Moreover, the proportion of firms deriving a high proportion of their income from new or renewed products and services was similar across both sectors, with about 30% of the firms in each declaring that over 20% of their income was from new products or services. Amongst those firms that declared they had focused all or part of their innovation efforts on new product developments, about 40% of the respondents in both sectors declared at least 20% of their income was due to new or renewed products or services. The absence of a significant difference in these distributions between manufacturers and service firms is interesting, as some have argued services find it more difficult to attribute sales to ‘new products’ than is typically the case amongst manufacturers. The evidence of the Innobarometer suggests this is not the case.

The Significance of Innovation in Investment

Innovation is also often a significant driver of investments. Almost 90% of the manufacturing firms declared that some of their investments were dedicated to innovation. Although this proportion was again slightly lower amongst service firms (83%), it is clear that in both sectors innovation drives at least some of firms’ investments (Figure 2.3).⁶ However, the link is usually partial, and often indirect. In both sectors, the proportion of firms that declared that all of their investments were linked to innovation was small, at 9% amongst manufacturers and just 4% amongst service firms. Perhaps surprisingly, there was not a large difference in these patterns amongst the firms that focused on process innovation in comparison with the full sample of firms.

Figure 2.3 The Significance of Innovation in Investments



⁵ This excludes firms that were unable to answer this question. The proportion unable to answer the question was greater amongst and service (14%) firms than amongst manufacturers (9%).

⁷ The following factors were suggested: 1 – ‘technological advance and Research and Development competencies’; 2 – ‘efficient production methods and making the best use of resources’; 3 – ‘flexibility and adaptability of production to market needs’; 4 – ‘leadership in finding out and exploiting new market trends’; 5 – ‘good co-operation practices with suppliers, customers or trade associations’; 6 – ‘qualifications of the staff and their professionalism’.

Strengths in Innovation

The survey asked the firms to identify the two most important factors contributing to their ‘strengths at innovation’.⁷ Amongst manufacturers, adaptability to meet market needs was the most widely identified factor, highlighted by almost half the respondents. By contrast, amongst service firms, staff qualifications and the professionalism of staff was the most widely recognised factor, this being identified by more than half the service firms. This is a notable difference and reflects the importance of the ‘human element’ in service provision and innovation which has been highlighted by earlier studies. Also notable here is the extent to which services recognise ‘co-operation practices within their supply chain’ as a key strength of innovation. Many commentators have highlighted the highly cooperative mode of innovation in services, and this finding supports that contention. It is however notable that over a third of manufacturers also highlighted ‘co-operation practices within the supply chain’ as one of their (two) strengths at innovation.

Despite the attention paid to R&D, technological advance and R&D competencies it was either the least or the second least likely of these factors to be identified in both manufacturing and service sectors. Thus, it was identified by less than one in five manufacturers, and by an even smaller proportion of the service firms (Table 2.2). Most firms, therefore, be they manufacturers or service firms, consider that their strengths in innovation do not rely on R&D activities. Notably, however, those that did identify R&D competencies as one of their key strengths in innovation were more likely to regard their innovation performance as superior to that of their competitors.⁸

Table 2.2 Strengths in Innovation by Sector

	Manufacturing	Services	Significant Difference?
Adaptability to Market Needs	48%	30%	✓ (at 1%)
Staff Qualifications and Professionalism	37%	54%	✓ (at 1%)
Co-operation Practices within Supply Chain	35%	43%	✓ (at 1%)
Efficient Production Methods	25%	13%	✓ (at 1%)
Technological Advance & R&D Competencies	19%	13%	✓ (at 1%)
Leadership in Market Trends	12%	18%	✓ (at 1%)

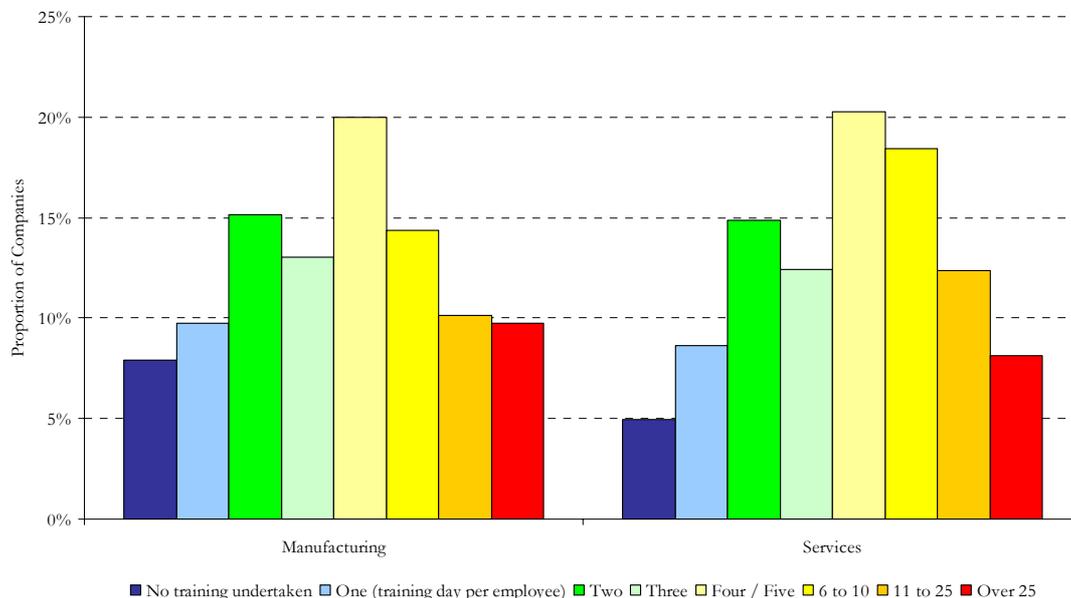
⁸ Amongst manufacturers, 28% of those that identified R&D as a strengths claimed their innovation performance was well above that of their competitors, compared with 10% amongst those that did not identify this factor, whilst only 4% of those that identified R&D as a strength admitted their innovation performance was below that of their competitors, compared with 13% of those that did not identify this factor. The corresponding figures for service firms were: 26% versus 13% and 1% versus 8%.

2.2.5 Engagement in Training

Perhaps surprisingly, given the significance of staff qualifications and professionalism as a ‘strength at innovation’, there is little evidence that services engage in more training activities than manufacturers. As Figure 2.4 suggests there is little difference between manufacturers and service firms in their commitments to training, although within each sectors there was considerable variation in firms commitments to training.

We will explore further issues related to accessing human capital and training in Chapter 7, as the Innobarometer found this was one of the most widespread barriers to innovation in services. Suffice to say now that whilst service firms recognise this as a problem area, they are often reluctant to make significant commitments to training. This is an area where policymakers should consider interventions, and we will suggest a policy measure in Chapter 8.

Figure 2.4 Commitments to Training by Sector



Means of Accessing New Technologies

The firms were asked to identify the most important ways by which they accessed new technologies⁹ (Table 2.3). The survey found that co-operations within the supply-chain (i.e., with suppliers and/or customers) was the most widely used means of accessing advanced technologies amongst both manufacturing and service firms. The use of co-operations is interesting here, as it suggests the co-development of technologies rather than the acquisition of standard, ‘off the shelf’ technologies. As such, it indicates services are not just passive adopters of technologies. The acquisition of new machinery and equipment was, however, the second most widely used route in both sectors, whilst

⁹ Each respondent could identify up to two of the following: 1. – ‘through acquiring machinery and equipment’; 2 – ‘through co-operations with customers or suppliers’; 3 – ‘through conducting in-house R&D’; 4 – ‘through co-operations with universities or R&D specialists’; or 5 – ‘through the acquisition of external intellectual property (such as by licensing in)’.

the conduct of in-house R&D was the third most widely used route, although this was considerably more widely used amongst manufacturers (44%) than amongst service firms (26%). R&D focused co-operations were also significantly more common amongst manufacturers than amongst services enterprises (17% versus 10%). Finally, acquiring intellectual property (such as licensing is) was slightly more widely used by service enterprises than by manufacturers, although in both sectors this was amongst the least used routes to access new or advanced technologies.

Three further points can be made from these findings. Firstly, whilst co-operations are important to services, they are also widespread amongst manufacturers – this is not a mode of innovation largely confined to services. Secondly, the adoption of new technologies is not more important in services – services are in general no more likely to be ‘passive adopters of technology’ than manufacturers (cf. Pavitt 1984). Thirdly, whilst R&D does appear more important amongst manufacturers, it is not insignificant amongst services.

Table 2.3 Innovation Type by Accessing of New Technology

	Manufacturing	Services	Significant Difference?
Co-operations within Supply Chain	54%	63%	✓ (at 1%)
Acquiring machinery or equipment	44%	39%	✓ (at 5%)
Conducting in-house R&D	44%	26%	✓ (at 1%)
R&D focused Co-operations	17%	10%	✓ (at 1%)
Acquiring IP (e.g., Licensing-in)	7%	11%	✓ (at 1%)

Engagement in Co-operation

The questions concerning firms’ ‘strengths at innovation’ and their means of accessing new technologies have highlighted the significance of co-operations (particularly within the supply chain), but the questionnaire also asked the firms directly about their engagement in co-operative activities to launch new products. This found that in both sectors, almost half of the firms had engaged in co-operations for ‘some time’, whilst in both sectors around 17% had recently begun to co-operate, and around 10% declared that they intended to co-operate in the future. The remaining quarter did not co-operate and did not intend to co-operate in the future (Table 2.4). These patterns are strikingly similar and again strongly suggest that the ‘co-operative mode’ of innovation which is widely attributed to services is also commonplace amongst manufacturers. Also similar were the distributions regarding the extent to which firms thought that co-operations would or would not be useful for innovation in the future (Table 2.5).

Table 2.4 Cooperation by Sector and Innovation Type

	Manufacturing	Services
Company has co-operated for some time	47%	48%
Company has recently begun to co-operate	17%	18%
Company intends to co-operate in future	10%	8%
Company does not co-operation nor intend to	26%	26%

Table 2.5 **Expectations about the Future Importance of Co-operations**

	Manufacturing	Services
Co-operations will be Very Useful	39%	38%
Co-operations will be Quite Useful	41%	43%
Co-operations will not be Especially Useful	12%	10%
Co-operations will not be At All Useful	8%	9%

Future Markets and Cooperative Profiles

The survey also asked the firms were asked about how they expected markets to develop with respect to their receptiveness to innovative products in coming years. Amongst both manufacturers and service firms, most companies expected markets to become more receptive to innovation, although about three in ten companies expected markets to remain unchanged, and one in ten expected markets to become less receptive to innovation (Table 2.6). This expectation that innovation will become more important in the future is reflected in the increasing emphasis placed on member state governments in the European Union and national governments towards supporting innovation policy, though as noted later in Chapter 8 this should be extended more towards including service as well as manufacturing industry.

Table 2.6 **Future Markets for Innovative Products**

	Manufacturing	Services
Markets will become more receptive to innovative products in coming years.	58%	61%
Markets will remain unchanged in their attitude to innovative products	33%	30%
Markets will become less receptive to innovative products in coming years.	9%	9%

2.3 Conclusions

In this chapter, we have used the Innobarometer to examine the extent of innovation in services and to make some simple comparisons with manufacturers. In conclusion, we emphasise the following points:

1. **The significance of organisational innovation in services.** The finding that over a third of the service firms interviewed stated that their only focus on innovation was in the form of organisational change means that this form of innovation needs to be investigated much more fully. By contrast, a much smaller proportion (8%) of manufacturers focused only on organisational change. The exclusion of organisational change from the Community Innovation Survey is an important bias in that survey against forms of innovation that appear more prevalent in services than amongst manufacturers. The absence of organisational change from these types of survey will therefore reduce the apparent innovation rate in services relative to manufacturers.

2. Aside from the significance of organisational change, the other striking difference between services and manufacturers was in their 'strengths at innovation'. In particular, service firms were more likely to emphasise their staff qualifications and professionalism than were manufacturers. This points to the high importance of human capital and skills in services and service innovation.
3. However, these differences aside there were a significant number of similarities in the pattern of findings for services and manufacturers. The extent of co-operations, for example, was widespread in both sectors, suggesting co-development, with neither sector dominated by the passive adoption of technologies. Also, whilst R&D activities were more widespread amongst manufacturers, they were not insignificant in services. They were also similar patterns in terms of the impact of innovation on sales, and with regard to the significance of investments for innovation. All these similarities suggest there is no 'great divide' between manufacturers and service firms with respect to innovation.
4. This said, we emphasise the high degree of diversity in the responses of both manufacturers and service firms to the Innobarometer survey. This diversity is wholly to be expected, as not only do both of these 'sectors' embrace a wide variety of different activities, but within each activity firms have different resources and attitudes to innovation. We will explore this diversity of behaviours in services (in relation to innovation) in the next chapter, which draws on an analysis of the second European Community Innovation Survey (CIS-2).

3 An Analysis of Services in the Second Community Innovation Survey

3.1 Introduction and the Extent of Innovation in Services

This chapter provides a review of findings from the Second European Community Innovation Survey (CIS-2) which covered innovative activities within service enterprises in 13 western European countries over the 1994-1996 period.¹⁰ The analyses is confined to the specific issues or questions posed in the CIS survey, and aspects of innovation, such as organisational change, which were not included cannot - for obvious reasons - be examined. Whereas the previous chapter was largely oriented to examining innovation in services in comparison with manufacturers, here our primary aim is to start 'unpacking' services and examining the diversity of innovation behaviours within and between different service 'sectors'.

The first issue concerns the extent to which services engage in (technologically) innovative activities.¹¹ It is apparent that the proportion of 'innovators' varied significantly between sectors, with only a quarter of transport service firms, and a third of wholesalers, introducing new services or methods to produce or deliver them, compared with 44% of technical service firms, almost half of financial service firms, and two thirds of computer service firms (Table 3.1). Such differences are to be expected, as some services (such as transport services) are engaged in much more stable activities – and provide a much more stable set of services – than others (such as computer services), amongst which innovation is more continuous and central to competitiveness. There is also significant variation between computer service engaged in innovative activities. This perhaps, overall, indicates that a substantial proportion of firms engage in activities within which 'discrete innovations' are difficult to identify. Significantly, the fact that a firm declared it did not 'innovate' does not necessarily mean that it did not invest in new technologies. Further analysis on the UK data (Tether 2001) shows that many of the 'non-innovators' introduced new technologies, such as e-mail and Internet access.

From studies of manufacturing, it has become customary to expect the propensity to innovate to increase with firm size. This has been explained by large firms tending to engage in more activities, and thus having greater scope for innovation (Sirilli and Evangelista 1998). This pattern is found for most of the service sectors covered by the CIS-2 data, but not, interestingly, for computer services where small firms appear as likely to innovate as large firms. In general, there also appears to be a weaker relationship between firm size and innovation in services than is commonly found for manufacturing, suggesting there are fewer economies of scale. This weakness of economies of scale would help explain the lower concentration of most service activities, except finance, as compared with manufacturing.

Table 3.1 Proportion of Innovating Enterprises

¹⁰ This review is based on research by one of the authors of this report and further details of the study are provided in Tether et al. (2001) and Tether (2003).

¹¹ The CIS-2 approached this by asking the firms: 'Between 1994-96, has your enterprise introduced onto the market any new or significantly improved services, or methods to produce or deliver services?' This is the basic 'innovation question', which was accompanied by a rather long and convoluted definition of 'technological innovation'.

	Innovating Enterprises ¹				Enterprises with Innovative Activities ²			
	All	Small	Medium	Large	All	Small	Medium	Large
All Services	36%	33%	41%	66%	41%	38%	45%	70%
Transport	24%	22%*	33%*	44%*	29%	27%*	35%*	50%*
Wholesale	32%	33%*	34%*	50%*	38%	40%*	36%*	54%*
Technical	44%	43%*	57%*	58%*	52%	52%*	62%*	69%*
Financial	48%	39%*	53%*	82%*	52%	41%*	55%*	85%*
Computer	65%	64%*	66%*	65%*	68%	67%*	67%*	67%*

1 – ‘Innovating enterprises’ are those that introduced a new service or methods to produce or deliver new services in 1994 – 96. 2 – ‘Enterprises with innovative activities’ includes both innovating enterprises and enterprises with incomplete or unsuccessful innovation projects undertaken in 1994 – 96. Small – Enterprises with 10 to 49 employees; Medium – Enterprises with 50 – 249 employees; Large – Enterprises with 250+ employees. * Due to restricted data availability, these results are based on findings from 6 countries (France [not wholesale], Germany, Ireland, Norway, Portugal, Sweden and the UK) rather than all 13 countries.

Unfortunately, one of the weaknesses of the CIS-2 is that it did not ask the firms that did not innovate why they did not innovate. It would be especially interesting to know how firms that are active in highly innovative sectors survive without innovating. These questions were not investigated, and instead the remainder of the survey addressed only the ‘innovators’. Another weakness of the CIS-2 survey is that it did not ask about the impact of the innovations on the firm, for example in terms of the percentage of turnover due to new services. Both of these problems have been addressed and rectified, at least to some extent, in the third Community Innovation Survey.

3.2 The Sources of Innovation

The fact that a firm claimed to have ‘innovated’ need not mean it developed its own innovation(s). The questionnaire asked the ‘innovators’: ‘who developed these services or methods?’¹² According to the findings (Table 3.2), about half the firms claimed that they had mainly developed their own innovations, with a third declaring the innovations were developed jointly with others, and about a fifth admitting they were mainly developed by others.¹³ These proportions differed significantly between sectors, with the external development of innovations being most common in transport services and least

¹² It should be noted that only three responses were available: ‘mainly other enterprises or institutes’; ‘your enterprise together with other enterprises or institutes’; or ‘mainly your enterprise’. This might be an oversimplification, for the answer can be a matter of perspective, particularly if the ‘innovation’ is based on an idea, the implementation of which required the adoption externally developed technologies. Is such an ‘innovation’ found in the idea or the technology required for its implementation, or both? Another limitation is that for innovators that involved external enterprises or institutes, the type of organisation(s) (i.e., customers, suppliers, etc.) involved was not detailed.

¹³ These findings treat each ‘innovator’ equally, but it is possible that if the significance of the innovations introduced were taken into account (Tether 1998), then the significance of these different sources might change. In particular, the significance of jointly developed innovations might be greater, because ‘higher levels’ of innovation activity tend to involve greater interaction and collaboration between firms (Tether 2002).

frequent in computer services. The pattern for the internal development was roughly the reverse of this, whilst that for the joint development of innovations varied less, but was greatest amongst financial services.

Table 3.2 Sources of Innovation

	<i>All</i>	Transport	Wholesale	Financial	Technical	Computer
Mainly by Others	18%	28%	16%	21%	15%	9%
Jointly with Others	32%	28%	32%	37%	31%	26%
Mainly In-House	51%	43%	51%	42%	54%	65%

Aside from highlighting a substantial rate of co-operative innovation which was reported by the respondents to the Innobarometer, these findings point to different patterns in the innovation processes of different sectors. Given their characterisation as ‘technology users’ (Evangelista, 2000), the relatively high dependence on externally developed innovations in transport services is unsurprising, especially if it is assumed that innovations ‘mainly developed by others’ were, in the main, developed by suppliers. But it is perhaps surprising that the extent of dependence on externally developed innovations was not greater. Over two fifths of the transport service firms claimed to be the authors of their own innovations. Although the source of the innovation can be a matter of perspective, if correct these results cast further doubt on the adequacy of the characterisation of transport service firms as (passive) ‘technology users’. By contrast, computer services appear to depend mainly on their own internal resources for innovation, although innovation is sometimes undertaken ‘jointly with others’ (which presumably refers to customers in most instances). Indeed, the relatively high rate of ‘joint innovation’ in financial services may well reflect collaborations with computer service firms, which are engaged for the development of bespoke or significantly customised information technology (IT) systems.

These findings raise more questions than they answer, but they do illustrate considerable diversity within as well as between service ‘sectors’ with respect to the sourcing of innovations. Many services admit a significant involvement of others - even a dependence on others – but most contend that they have undertaken (at least some of) the creative activities necessary for the introduction of their own innovations. This contrasts with the widely held perception that services are mere passive, ‘supplier dominated’ adopters of externally developed technologies. The findings also suggest the strong emphasis on ‘interactive innovation’ as the dominant mode of innovation in services, may be exaggerated, for even in technical services, which might have been expected to exhibit a high level of interactive innovation, only about a third of the firms admitted to having innovated ‘jointly with others’.

Engagement in Research and Development Activities

Further evidence that services actively engage in technologically creative activities is found in the extent to which they undertake R&D. Traditionally, services other than those in the ‘peculiar sectors’ of telecommunications and computer services have been assumed not to engage in R&D. Indeed, Pavitt’s (1984) classification of services as ‘supplier-dominated’ activities partially derived from the statistical evidence available at that time which showed that services undertook very little R&D. In recent years, R&D surveys have recorded substantially more R&D as being undertaken by services, and not just by computer services and telecommunications (Young, 1996). The extent to which this reflects real change, or a growing recognition by statistical agencies (and the responding firms) that services engage in R&D is unclear, but it does suggest that services are more technologically creative than has been widely supposed.

Table 3.3 Engagement in Research and Development Activities amongst Service Enterprises engaged in Innovation Activities

	No R&D	Occasional R&D	Continuous R&D
All Services	47%	26%	27%
Small Enterprises	49%	26%	25%
Medium Enterprises	45%	27%	28%
Large Enterprises	38%	23%	38%
Transport Service	71%	23% [~1%]	5% [~1%]
Wholesale Services	55%	25% [2%]	19% [4%]
Financial Services	51%	25% [2%]	24% [2%]
Technical Services	31%	35% [4%]	34% [10%]
Computer Services	23%	23% [3%]	54% [14%]
Mainly developed by Others*	83%	16%	1%
Developed Jointly with Others*	43%	30%	27%
Mainly developed In-house*	36%	27%	36%

* These results are based on findings from 6 countries (France, Germany, Ireland, Norway, Portugal, Sweden and the UK) rather than from all 13 countries. The figures in square brackets are the median of R&D employees as a proportion of total employment. These medians are derived from the data for the 6 countries listed above.

The CIS-2 survey found that about half of the firms that engaged in innovative activities undertook R&D, with roughly half of those doing so on a continuous basis (Table 3.3).¹⁴ As expected, considerable variation existed between sectors in the proportion of innovating firms engaged in R&D – being lowest (as expected) amongst transport services, and highest (again as expected) amongst computer services. But it is perhaps surprising that as many as 30% of the innovating transport service firms claimed to be engaged in R&D, even if most undertook only R&D on an occasional basis. Firm size also had some influence here, as did the sourcing of innovations. Unsurprisingly, firms that introduced innovations (mainly) developed by others were less likely to engage in

¹⁴ It is also worth noting that the figures presented in Table 4 again consider each innovator equally, but it may well be that those engaged in higher levels of innovation activity are more likely to engage in R&D.

R&D, but even amongst this group some did (although very rarely on a continuous basis). This suggests that even amongst ‘technology users’, significant learning can be necessary to introduce innovations (and which is necessary to sustain and develop a firm’s absorptive capacity (Cohen and Levinthal 1990). Amongst those that developed their own innovations, or which developed innovations jointly with others, more than half (claimed to have) engaged in R&D, with roughly a third doing so continuously.

Unfortunately, the survey does not provide information on other sources of innovation internal to the firm. It may well be that many firms were undertaking R&D type activities but did not recognise these as R&D, as R&D is often perceived by respondents to be a formal distinct activity (Howells et al. 2001). Table 3.3 also shows, for each sector, the median proportion of R&D employees in total employment for firms engaged occasionally and continuously in R&D. This varies considerably between sectors, but this data, especially for computer and technical service firms, indicates substantial variation in commitment to R&D amongst firms operating in the same sector. Some firms appear to be committing substantial resources to R&D, whilst others are not (or did not claim to be) engaged in R&D. How far this variation is real, or due to interpretive differences, is not clear, but it is likely that significant real variation does exist.

Expenditures on Innovation-Related Activities¹⁵

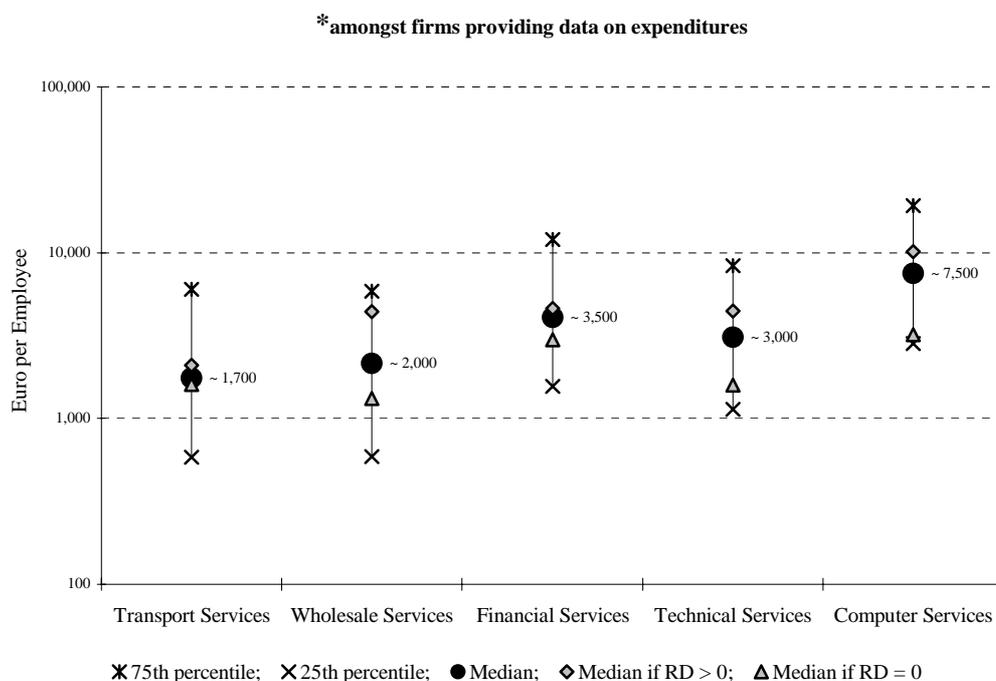
Another indicator of the variation between and within sectors is found in the extent to which firms committed resources to innovation activities. This can be assessed through the question that asked the firms about their expenditures, in 1996, on seven innovation-related activities. These were expenditures on: internal R&D; the acquisition of externally undertaken R&D services [Acquired R&D]; the acquisition externally developed machinery and equipment [Acquired M&E]; the acquisition of other externally developed technologies [Acquired OET]; on preparations for the introduction of innovations [Preparations]; on training directly linked to innovation [Training]; and on the market introduction of innovations [Market Introduction.]. The sum of spending on these activities provides the total expenditure on innovation activities (in 1996).

These data are interesting because they indicate the extent to which firms committed resources to innovative activities, although they also come with a ‘health warning’ as the categories are subject to interpretation. For example, whether an expenditure on training is linked to innovation depends on what is understood by ‘innovation’ (and indeed ‘training’). For those that provided this data, Figure 3.1 shows - for each of the five sectors - the median total expenditures per employee, together with the expenditures of the firms at the 25th and 75th percentiles of each sector’s distribution. This shows two things. Firstly, the amount recorded as having been spent on innovation varies significantly between sectors. On a per employee basis, the median computer service firm is recorded as having spent roughly four times the amount that the median transport

¹⁵ This section is based on data from France, Germany, Ireland, Norway Portugal, Sweden and the UK. For simplicity each country’s the data has been treated as a simple rather than a weighted sample, with the findings for each country then weighted in accordance with the methodology outlined in Appendix A to provide the reported finding. An alternative processing of the data would result in slightly different patterns, but as emphasised throughout the paper, the findings should be interpreted as indicative, rather than as exact.

service firm spent. But the figure also shows that the level of expenditure recorded varies widely between firms active in the same sector. It is common for the firm at the 75th percentile of the expenditure distribution to be recorded as spending up to 10 times (per employee) the amount of the firm at the 25th percentile. They are also skewed to the left – the mean expenditure would be considerably greater than the median. To some extent, this variation may be a product of the methodology. Apart from differences in interpretation as to what constitutes innovation, the data refer to a single year, 1996, and it is quite possible that a firm’s expenditure in that year was atypical of its normal pattern of expenditure on innovation. Especially in small firms, innovation expenditures can vary widely year on year, especially if these involve substantial lumpy investments in capital equipment. For these reasons, there may be less intra-sectoral variation in reality than appears from the data. It is likely, however, that if these methodological problems were overcome, substantial intra-sectoral variation in commitments to innovation would remain.

Figure 3.1 Expenditure on Innovation Activities in 1996*

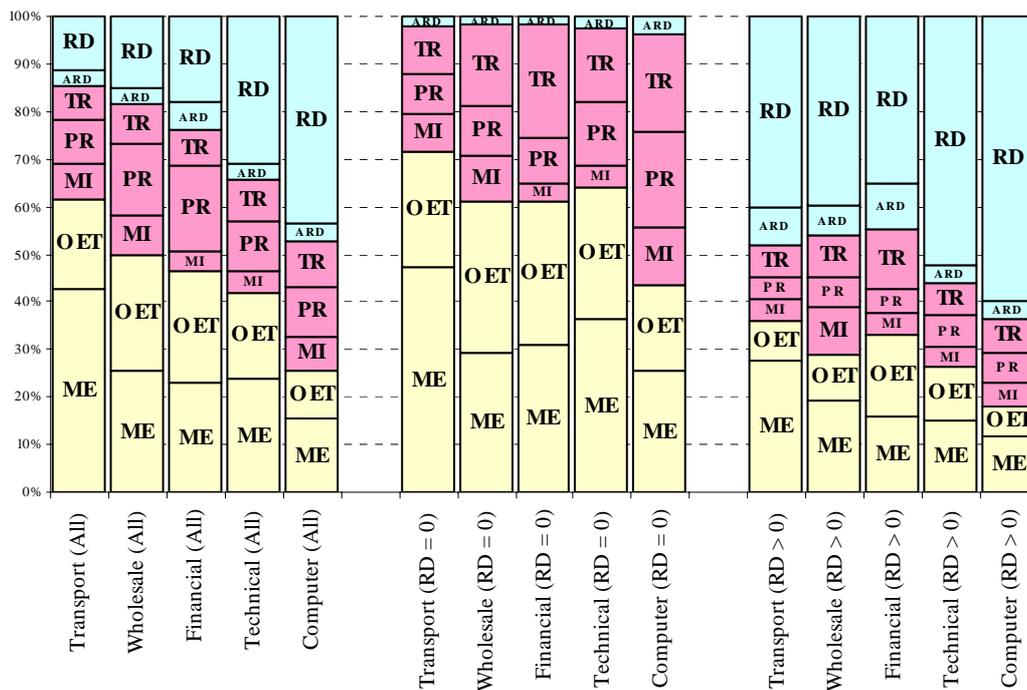


The second interesting aspect of this data is the composition of innovation costs and how this varies both between and within sectors. The mean distribution of innovation costs amongst firms active in the various sectors shows the importance of the various activities differs substantially between these sectors (Figure 3.2).¹⁶ In particular, internal (or intramural) R&D accounts on average for only about 10% of total innovation costs amongst transport service firms, but over 40% of these costs amongst computer services (which, as has been shown, also tend to claim much more expenditure per employee on

¹⁶ Note that this treats each firm (which provided innovation costs data) equally, whether it spent a lot of a little on innovation. This is partly because of the methodological difficulties discussed above in relation to the total spending on innovation.

innovation). The relative importance of investments, both in machinery and equipment and in other externally developed technologies (such as computer software), tends to follow the opposite pattern, together accounting for (on average) only about a quarter of innovation costs in computer services, but about 60% of these costs in transport services. In all five sectors the remaining quarter to 30% of innovation costs were spent on ‘preparations’ for the introduction of innovations, on training directly linked to innovation, and on the market introduction of innovations.¹⁷ The term ‘preparations’ is especially vague, but the finding that training (directly linked to innovation) accounted for – on average - less than 10% of total innovation costs, may suggest that on the whole relatively little (‘off the job’) learning on the part of labour was required for the introduction of the innovations. Meanwhile, the finding that the market introduction of innovations tended to constitute only a small proportion of total innovation costs suggests that ‘product’ innovations tended to be introduced into already established market relations, and consequently the high costs of market formation were rarely incurred.

Figure 3.2 The Distribution of Expenditure on Innovation by Sector



RD - Internal R&D; ARD - Acquired R&D; TR - Training; PR - Preparations; MI - Market Introduction; OET - Aquired Other External Technologies; ME - Acquired Machinery & Equipment

It must be emphasised that the above is just an ‘average’ picture (based on sample means) and as such conceals substantial variation. One illustration of how this average varies is shown by considering two sub-samples: one of those firms that (claimed to have) incurred expenditures on internal R&D; the other of those that did not. For the firms that did not incur expenditures on internal R&D, acquired technologies accounted for

¹⁷ In each sector, a small proportion of innovation costs were spent on acquired R&D services.

(on average) over 60% of total innovation costs in all sectors (except computer services where they accounted for about 45% of costs). The three ‘other’ activities of preparations, training and market introduction, accounted for the almost all of the remainder.

Interestingly amongst firms that declared expenditures on internal R&D, this activity tended to account for a substantial share of total innovation cost (which in all sectors tended to be higher than amongst firms that did not declare expenditures on intramural R&D). Even in transport services, an average of about 40% of total innovation costs were assigned to R&D amongst those (few) firms that claimed expenditures on this activity. In computer services this proportion reached 60%. These findings suggest that when R&D is undertaken it tends to constitute a substantial proportion of total innovation related activities, even in firms active in ‘supplier dominated / technology user’ sectors.¹⁸ These distributions highlight both the diversity that exists between sectors (in terms of average behaviour) - from a high dependence on acquired technologies in transport services (which, incidentally, need not imply ‘supplier dominance’), to a dominance of internal activities in computer services - as well as what appears to be significantly differentiated behaviour within sectors.

Participation in Co-operation Arrangements for Innovation

It is often thought that services depend heavily on co-operative arrangements for their innovation activities, and our analysis of the Innobarometer data showed co-operations were often important (Chapter 2), but amongst manufacturers as well as services. This section examines the extent to which services interact with other organisations for innovation, particularly their participation in co-operative arrangements for innovation¹⁹. The survey found that about 30% of the innovating service firms had engaged in co-operative arrangements for innovation with external partners (Table 3.4). This proportion is much smaller than that found by the Innobarometer,²⁰ but still suggests these arrangements are quite widespread (implying significant inter-organisational learning), although not necessary for innovation in services. It may be that different types of ‘innovation’ tend to be achieved through co-operations as compared with those that are achieved by firms ‘going it alone’. In particular, ‘low-level’ technological adoption or imitative innovation might predominate amongst firms that innovated

¹⁸ Again we caution about possible mismeasurement – are all of those firms recorded as not undertaking R&D genuinely not doing so, or are some not recognising some of their activities as R&D and therefore not recording this as an innovation expenditure? Such an under-recording of R&D and total innovation costs can lead analysts to infer that services are less innovative or less committed to innovation than is truly the case.

¹⁹ Such arrangements were defined in the survey as “active participation in joint R&D and other innovation projects with other organisations. It does not necessarily imply that both partners derive immediate commercial benefit from the venture. Pure contracting-out work, where there is no active participation, is not regarded as cooperation.” A ‘supplier-dominated’ perspective would suggest that services rarely engage the inter-active learning associated with co-operative arrangements for innovation. Instead, they adopt standard, ‘off-the-shelf’ technologies. On the other hand, some researchers suggest that services are highly interactive, and co-operation, particularly with customers, is common place. Indeed, it may even be considered the *modus operandi* of innovation in services.

²⁰ The CIS asked about formal co-operative arrangements for innovation, whereas the Innobarometer may have been taken to have asked about formal and informal co-operations.

independently, whilst co-operations may be associated with more substantial, complex or uncertain developments, particularly where these involve changes to the services provided (Tether 2002).

Table 3.4 Engagement in Co-operative Arrangements for Innovation

	All	Transport	Wholesale	Financial	Technical	Computer
Any External Partner	30%	24%	30%	36%	39%	44%
Suppliers	17%	11%	17%	16%	17%	22%
Customers / Clients	15%	9%	13%	13%	21%	20%
Competitors	11%	8%	10%	10%	9%	15%
Consultants	11%	6%	9%	16%	8%	13%
Research Institutes	9%	5%	8%	3%	14%	11%
Universities	8%	5%	6%	3%	15%	14%

The unsurprising finding that co-operations were more common (at around 40%) amongst firms engaged in the more technologically dynamic activities of computer and technical services lends support to this interpretation, but unfortunately the questionnaire did not ask the firms directly about the nature or purpose of the collaborations, nor about how significant they were for the firms' innovation activities. When assessed by the different types of collaboration partner, suppliers and customers (or clients) were the most widely engaged, but the proportion of firms with these arrangements was perhaps surprisingly small (particularly in light of the Innobarometer findings). Even amongst the technical (and computer) service firms, which tend to be characterised as highly interactive and providers of co-produced innovations, only a fifth of the innovators had engaged in collaborative arrangements for innovation with their customers. Universities and research institutes were the least widely engaged partner types, but some firms did have collaborations with these. Again, such collaborations may be associated with higher-level innovation activities, and consequently the small proportion of firms with these arrangements may understate their true significance (Tether 2002).

Sources of Information for Innovation

The analysis of (formal) co-operative arrangements for innovation suggests these are neither rare nor commonplace amongst innovating service firms. The evidence on the broader importance of various 'sources of information' for innovation is now examined.²¹ Table 3.5 ranks these sources from highest to lowest in accordance with the proportion of firms that indicated they were 'very important'. Also shown is the

²¹ This derives from a question that asked the firms to rank the importance of various 'sources of information' between 0 – 'not relevant' and 3 – 'very important'. What constitutes 'information' for innovation is not clear, and was not specified by the survey, but it was intended to identify the sources of ideas for innovations and how to implement these. The nature of the 'information' is likely to vary significantly between sources – for example between the technical information found in patents and the market information sought from customers – but unfortunately there is no further classification. Another difficulty is how the question was answered, as the importance of a source may be judged relative to other sources, or in an absolute sense.

proportion of enterprises that indicated the source was ‘relevant’. ‘Sources (of information) within the firm’ itself were the most widely recognised as relevant and very important source for innovation (echoing the findings of Sundbo and Gallouj 2000). Unfortunately, ‘sources within the firm’ was not disaggregated further to identify which sources within the firm were used, but it does suggest most firms (including many that did not claim to undertake R&D and only introduced externally developed innovations) perceive themselves to be taking an active role in sourcing innovations; they are not just passive adopters of technology.

Amongst the various external sources of information for innovation, the most widely identified as both relevant and very important were customers (or clients), suppliers, and competitors. Over 80% recognised customers as a relevant source of information for innovation, and it is notable that significantly more firms recognised customers as a very important source of information than engaged in collaborative arrangements for innovation with them. This suggests that although formal collaborations with customers were not especially common, informal interactions were frequent. It may be that the Innobarometer results which show a higher rate of co-operation arrangements for innovation combine these formal and informal forms of collaboration.

Table 3.5 The Importance of Sources of Information for Innovation

	<i>All</i>	Transport	Wholesale	Financial	Technical	Computer
Sources within the Firm	89 [47]	<u>78</u> [<u>36</u>]	89 [43]	94 [53]	90 [47]	<u>95</u> [<u>60</u>]
Customers / Clients	84 [43]	<u>81</u> [43]	83 [47]	82 [<u>33</u>]	83 [39]	<u>90</u> [<u>53</u>]
Suppliers	76 [21]	77 [22]	<u>79</u> [<u>25</u>]	<u>72</u> [17]	<u>79</u> [19]	74 [<u>15</u>]
Competitors	77 [16]	74 [16]	<u>82</u> [<u>23</u>]	<u>82</u> [17]	<u>71</u> [9]	74 [12]
Fairs & Exhibitions	71 [13]	58 [7]	<u>80</u> [<u>21</u>]	<u>52</u> [2]	75 [12]	78 [12]
Prof. Meetings / Journals	73 [11]	<u>57</u> [7]	71 [9]	77 [7]	<u>86</u> [18]	82 [<u>19</u>]
Computer Networks	61 [11]	<u>40</u> [6]	62 [8]	65 [8]	69 [16]	<u>80</u> [<u>23</u>]
Consultants	52 [9]	<u>44</u> [8]	51 [10]	<u>65</u> [<u>14</u>]	60 [8]	56 [5]
Universities	38 [4]	<u>24</u> [2]	35 [3]	33 [1]	<u>60</u> [8]	52 [8]
Research Institutes	36 [3]	32 [7]	46 [1]	<u>26</u> [1]	<u>54</u> [5]	41 [2]
Patents	19 [1]	12 [<1]	<u>24</u> [<1]	10 [<1]	<u>24</u> [2]	22 [<1]

First figures = % of firms identifying the aim as relevant; Figures in parenthesis = % of firms identifying the aim as ‘very important’. X – lowest of the five sectors; X – highest of the five sectors.

Meanwhile, three-quarters of the firms recognised suppliers and competitors as relevant sources of information for innovation, but it is perhaps surprising that greater proportions did not identify these – and especially suppliers - as ‘very important’. This suggests the great majority of services do not see themselves as being dependent on suppliers for innovation, even though (as has been shown) a substantial share of their innovation costs are accounted for by investments. Thus, while suppliers are an important source of technology, they are perhaps not a major source of ideas that lie behind the innovations (which may draw mainly on either internal business process knowledge or market knowledge). Instead, services seem to source ideas for innovation from many internal and external sources, and may invest in new technologies from

suppliers to implement their innovative ideas. This wide sourcing of ideas perhaps explains the high proportions of firms that identified fairs and exhibitions, professional meetings and journals, and computer networks as relevant sources of information for innovation. In essence, new technologies may facilitate innovations, but they do not define the innovations entirely, and nor is new technology necessary for innovation.

As the third most widely identified external source of information for innovation, the importance attached to competitors is notable. It is sometimes argued that service innovations (as opposed to internal process innovations) are difficult to protect from imitation (Miles et al. 2000). In this context, a high level of competitor watching is to be expected, whereby firms observe the behaviour of their competitors and seek to monitor the impact of any innovations they may introduce. If their rivals' innovations appear successful, the firm will seek to rapidly imitate them. This problem of rapid imitation may be less frequent when competitors have more differentiated, and less imitable capabilities, and it is notable that competitors are less likely to be seen as a 'very important' source of information amongst technical and computer services, which are likely to have more distinctive and less imitable technological capabilities. The four least widely recognised sources of information for innovation were consultants, universities and research institutes and patents. None of these sources was identified as 'very important' by more than 10% of the innovating firms, although individually financial services attached greater importance to consultants. This suggests these sources are rarely important for innovation in services, but it may be that they are used more frequently by service firms engaged in higher levels of innovative activity.

Indeed, further analysis of the data using factor analysis suggests three groups of sources, other than those within the firm, suppliers and customers. These are: 1) competitors – which suggests these firms may be following an imitative strategy, watching their rivals and seeking to copy their successes whilst avoiding their mistakes; 2) – a combination of professional conferences, meetings and journals, computer networks and fairs and exhibitions, which suggests a search strategy of actively scanning the environment for ideas and technologies for innovations; and 3) – universities, research institutes and patents – which suggests an importance of disembodied technical information, perhaps associated with higher levels of innovation. Although none of these were exclusive to firms in any particular sector, the first was more common amongst financial services and wholesalers, and was less common amongst computer and technical services; the second was especially common amongst technical services, but was uncommon amongst computer and transport services; whilst the third was uncommon amongst transport services but more common amongst technical and computer services. These patterns require fuller analysis, but they do suggest variety within as well as between service sectors in the sourcing of information for innovation.

3.3 Why Innovate?

The final question is ‘why do firms innovate?’ To address this, the survey asked the firms to rank a variety of aims or objectives of innovation²². Of these, improving service quality was the most widely recognised; 95% of the innovating firms declared it relevant to their innovation activities, and over 60% claimed it was ‘very important’ (Table 3.6). Opening new markets (or increasing market share) and extending the service range were also widely recognised (each was relevant to about 85% of the innovating firms, and ‘very important’ to about half). The high significance attached to these aims suggests a strong ‘product’ orientation to the innovation activities of the service firms, but as service outputs typically lack an independent physical existence (Gallouj and Weinstein 1997), there is commonly a close nexus between the process (and organisation) of provision, and the nature of the services provided²³.

Improving the internal business process and reducing labour costs were recognised as relevant by about 80% and 70% of the innovating firms respectively, and each of these was ‘very important’ to about 30%. These aims are generally associated with ‘process innovation’, but these changes may impact directly on the nature of the services provided (i.e., they may have ‘product innovation’ type effects; Hipp et al. 2000). For example, the aim of increasing the flexibility of internal business processes may relate to a more fundamental objective of responding more fully (or rapidly) to differentiated or changing users needs. Such flexibility can be a source of differential pricing, and higher profit margins. The relatively high significance of reducing labour costs is unsurprising given the high labour intensity of many services, although changing the nature of the labour employed can impact significantly on the nature of the services provided. It is notable in this context that reducing labour costs is less widely recognised as a significant aim of innovation in computer services. The other objectives of innovation were less widely recognised.²⁴

²² The ranking of these aims ranged from 0 – ‘not relevant’ and 3 – ‘very important’, the importance of ten ‘aims or objectives of innovation’. These were: replace (old) services being phased out; improve service quality; extend the service range; open up new markets or increase market share; fulfil regulations and/or standards; improve internal business process flexibility; reduce labour costs; reduce materials consumption; reduce energy consumption; and reduce environmental damage.

²³ This means it can be difficult to apply the conventional distinction between product and process innovation. Perhaps it is better to distinguish between inward and outward looking innovation activities. Inward looking activities are concerned with how the firm undertakes its activities. Changes to these, which are often associated with reducing costs, may have knock-on effects on the services provided. Outward looking innovation activities are related to how the firm interacts with others, most notably its customers. The firm may seek to provide improved services to better meet its customers requirements, but it may also introduce new or alternative means of delivering services (e.g., internet banking). This contrasts with the conventional association of delivery with process innovation. Put simply, changes to the services provided can be achieved through changes to the process of provision (Hipp et al. 2000).

²⁴ Fulfilling (or complying with) regulations and/or standards, and replacing previous services were both recognised as relevant by more than half the innovating firms, and roughly half claimed each of reducing the environmental damage, reducing materials costs, and reducing energy costs were relevant objective of innovation.

Table 3.6 Aims of Innovation

	<i>All</i>	Transport	Wholesale	Financial	Technical	Computer
Improve Quality	92 [63]	94 [62]	<u>89</u> [61]	93 [74]	<u>97</u> [66]	91 [65]
Open New Markets	88 [53]	<u>81</u> [43]	86 [54]	90 [48]	<u>91</u> [53]	86 [60]
Extend Service Range	86 [45]	<u>79</u> [32]	84 [40]	90 [49]	<u>92</u> [52]	89 [58]
Improve Flexibility	79 [30]	79 [33]	80 [32]	<u>87</u> [37]	80 [32]	<u>73</u> [24]
Reduce Labour Cost	72 [28]	74 [40]	71 [27]	<u>81</u> [34]	76 [32]	<u>59</u> [17]
Fulfil Regulations, etc.	68 [21]	67 [31]	69 [18]	71 [22]	<u>74</u> [25]	<u>56</u> [14]
Replace Old Services	62 [21]	<u>53</u> [21]	60 [20]	62 [21]	67 [18]	<u>73</u> [32]
Reduce Env.* Damage	52 [14]	<u>66</u> [30]	54 [18]	<u>25</u> [4]	56 [15]	27 [5]
Reduce Energy Use	46 [13]	<u>57</u> [25]	49 [14]	41 [7]	53 [14]	<u>30</u> [7]
Reduce Materials Use	46 [13]	<u>65</u> [32]	49 [15]	35 [5]	54 [10]	<u>27</u> [3]

First figures = % of firms identifying the aim as relevant; Figures in parenthesis = % of firms identifying the aim as 'very important'. X – lowest of the five sectors; X – highest of the five sectors. * Env. – Environmental.

Factor analysis was undertaken to analyse these aims of innovation further. This was done for France, Germany and for the UK and Ireland (pooled),²⁵ and discovered very similar results (Table 3.7).²⁶ In each case a three factor solution was found (with initial Eigenvalues > 1), which explained about 60% of the total variation. In all three cases the first factor was associated with cost reductions (especially energy and materials costs), but also with regulatory compliance (or fulfilling standards) and with reducing the environmental impact of services. Reducing labour costs also loaded on this factor, although this was also important to the second factor, which was associated with service enhancement and continuous improvement. Reducing labour costs apart, this second factor loaded heavily on improving the flexibility of the business process, and improving the quality of the services provided (and in the case of France with replacing obsolete services). This combination points to finding the appropriate balance between efficiency and effectiveness in service provision. The third factor was clearly associated with market expansion, loading heavily on opening new markets (or increasing market share) and extending the service range.

It comes as no surprise that the first of these factors had a strong sectoral association, with transport service firms (and to a lesser extent wholesalers) being more likely to score highly on this cost reduction factor, whilst computer services were less likely to score highly on this factor. The second and third factors had weaker sectoral associations, although financial services tended to score highly on the improvement/service enhancement factor, and computer services tended to score more highly on the market expansion factor. But while firms in certain sectors may have been more or less likely to score highly on each of these factors, none of the factors was associated exclusively with

²⁵ These two countries have been combined to increase the sample size and this is justified because there is no language difference so the understanding of innovation should be similar.

²⁶ Further analysis on the Portuguese data, and that for Norway and Sweden (pooled) also found similar results (especially for Portugal).

one or two sectors. Instead, firms in all sectors had high and low scores for each of the factors, which highlights intra-sectoral variety in the aims or objectives of innovation.

How the pursuit of these different strategies influences innovation behaviour within a given sector is a matter that deserves fuller investigation. An initial analysis of the French data (which provides the largest sample) shows that, after controlling for firm size and sector of activity, those firms that scored highly on the market expansion factor were more likely to engage in R&D and were more likely to have co-operative arrangements for innovation. However, these finding was not repeated for the German or UK and Irish samples. A fuller analysis of these relationships is not provided in this report, partly because of space restrictions, but also because of restrictions placed on data analysis and reporting by Eurostat. The pursuit of different objectives of innovation amongst firms in the same sectors does however illustrate the scope for strategic positioning within service sectors. The initial findings from the French data suggest these different strategies have an influence on the nature of the activities engaged in for innovation.

Table 3.7 Rotated Factor Matrix of the Aims of Innovation

	<i>F-f1</i>	F-f2	F-f3	<i>D-f1</i>	D-f2	D-f3	BI-f1	BI-f2	BI-f3
Reduce Energy Use	0.85	0.18	-0.09	0.90	0.09	0.06	0.91	0.11	0.00
Reduce Materials Use	0.80	0.26	-0.11	0.80	0.24	0.11	0.81	0.21	0.05
Reduce Env.* Damage	0.66	-0.27	0.30	0.89	0.01	0.04	0.86	0.03	-0.02
Fulfil Regulations, etc.	0.61	0.21	0.19	0.50	0.32	0.10	0.53	0.24	0.19
Reduce Labour Cost	0.47	0.61	0.03	0.50	0.58	-0.05	0.39	0.69	-0.11
Improve Flexibility	0.35	0.65	0.16	0.22	0.78	-0.05	0.07	0.83	-0.07
Improve Quality	0.10	0.63	0.40	0.00	0.74	0.09	0.00	0.61	0.36
Replace Old Services	-0.04	0.69	0.08	0.08	0.28	0.22	0.15	0.29	0.14
Open New Markets	0.10	0.14	0.82	0.11	0.08	0.84	0.16	-0.08	0.80
Extend Service Range	-0.01	0.19	0.84	0.02	0.00	0.86	-0.07	0.22	0.78

F – France; D – Germany; BI – Britain and Ireland. -f1 / -f2 / -f3 – Factors 1, 2 and 3. These factors were extracted using Principal Component Analysis with Varimax Rotation. All factors had initial Eigenvalues > 1. Total Variance Explained by these three factors was 62% for France, 61% for Germany, and 60% for Britain and Ireland. * Env. – Environmental.

3.4 Conclusions

This chapter has provided a review of findings from the second European Community Innovation Survey (CIS-2) with respect to the extent and patterns of innovation in services. The analysis has consistently found evidence of diversity in the behaviour of service firms with respect to innovation, and not only between but also within sectors. An important difficulty in analysing these differences (particularly within sectors) is that there are two sources of variety: the first is genuine differences between firms in their activities; the second is differences in interpretation with respect to the meaning of the concepts (innovation, R&D, etc.) being investigated by the survey instrument. We recommend that future versions of the CIS should seek to reduce the scope for interpretive flexibility in answering the survey.

One of the reasons for the variation within ‘sectors’ in innovation behaviour is that ‘sectors’ contain a considerable diversity of activities. Take computer services, as defined at the two-digit level in the standard industrial classification (NACE Rev.1 72). This ‘sector’ is usually considered ‘high technology’, ‘knowledge intensive’, and ‘innovative’, but it contains some very routine activities, such as data entry. It is reasonable to expect significant variation in behaviour between these activities and others, such as writing computer software or providing consultancy services. We stress that this is not just an argument for finer sectoral definitions, for there can also be significant differences between activities that are very similar. Consider, for example, the differences in innovation trajectories of the ‘traditional’ airlines, such as Air France, British Airways and Lufthansa, and the low cost or ‘no frills’ carriers, such as EasyJet and Ryan Air, all of which would be classified by NACE Rev.1 as 62.10. Both the traditional carriers and the low cost airlines are innovating, but in different ways. Their innovation strategies are based on positioning for different segments of demand, and different understandings or conjectures about future market development. It is this differential behaviour amongst firms within the same ‘sector’ which leads to the evolution (and perhaps splitting) of the sector. Sectors are therefore not static, but dynamic.

Although only descriptive, the analysis presented in this Chapter points to significant variation both between and within sectors. Some firms may be ‘innovating’ by simply copying their rivals and/or by adopting externally developed, ‘off-the-shelf’ technologies. This requires little creativity and risk taking, and it is questionable whether these firms deserve the title ‘innovators’. But others are undertaking genuine innovation, and some are committing substantial resources to innovation activities, including R&D. A significant proportion are also engaged in co-operative arrangements for innovation, quite possibly to co-develop significant innovations. But, overall, the point is there is considerable variety amongst ‘innovating service firms’ that is not wholly explained by the nature of the particular sectors in which they operate. This variation deserves much fuller investigation and explanation in the future.

4 Innovation and Change in Four Service ‘Sectors’ Part 1 - Introduction

4.1 Introduction and Rationale

In the two previous chapters, we examined evidence on the extent, patterns and purpose of innovation in services, using two existing data-sets: the ‘Innobarometer of 2002’ (Chapter 2) and the second European Community Innovation Survey (CIS-2) (Chapter 3). These studies have shed considerable light on innovation in services, but for the purpose of this project we undertook our own research and survey, in which we focused on innovation in four ‘sectors’. This chapter outlines the rationale for that approach, and then introduces the four ‘sectors’ selected, providing an overview of the sectors and their innovation dynamics. To help conceptualise the nature of innovation in these sectors, we have included evidence from the ten ‘case studies’ that were undertaken as part of this study. In Chapter 5 we will examine the survey evidence and in Chapter 6 we will use the survey evidence to investigate the ‘drivers of innovation’.

Given that innovation in the service sector represents an important phenomenon to study, there remain a number of problems in its analysis. The sheer size and significance of the sector within the economy creates its own problems. As has already been pointed out, services account for about two thirds of economic activities, a share that is increasing, but services are also far from homogeneous. In addition, they also interact amongst themselves and with other sectors of the economy (notably manufacturing) in complex ways. Thus, there is a significant challenge in reporting the diversity of activities covered by the services sector, and to provide an informed commentary on the innovation trends across these diverse activities. Furthermore, many of the most important elements in service innovation are tacit and intangible in nature, as they are associated with personal knowledge, training and informal interaction. Other issues, such as service automation and the significance of self-service, are important aspects of the innovation process within service activities, but remain largely uncharted for the purposes of providing an adequate mapping and measuring of the new service economy.

Consequently, although much progress has been made to study innovation and dynamic growth within the service sector, most notably through the Community Innovation Surveys (CIS 1992; 1996; 2001), significant conceptual and empirical gaps still remain. In part, this stems from conceptual gaps in our understanding of the innovation process within services, where all too often services are assumed to play a subordinate role to the ‘proper’ innovation processes occurring within manufacturing. Associated with this, there have been problems with measuring service innovations, which in part stem from inadequate conceptualisation of service innovations, but also relates to their very essence. Service innovations are difficult to capture with existing measurement tools because of their often tacit, disembodied nature. Lastly, underlying this there are intrinsic, dynamic qualities of services, such as their emphasis on customisation, variation and continuous change (rather than punctuated change) which make them difficult to study. This also relates to factors such as the ‘servicisation’ of manufacturing and the blurring of these two great ‘sectors’.

For all these reasons, knowledge about services has been inadequate. As a consequence, policies that involve supporting service innovation and growth have been poorly articulated, and possibly inappropriate. By contrast, issues and barriers to service development have received little or no attention. For example, the role of training and skill development, given its importance in service firms' performance, has received minimal support from governments. Equally, the role of IT as an enabling technology and as a mechanism through which to generate and develop creative new service products has also received scant attention from policymakers.

To meet this challenge of size, diversity and intangibility our approach focused on a fourfold typology of different service activities and conditions. As argued earlier, the services sector covers a very wide range of activities and the project therefore focused on some particular 'sectors' rather than all service activities. The sectors selected, however, seek to represent the range and diversity of the different types of transformation process involved in services (Tether and Metcalfe 2004). Four types have therefore been defined (Table 4.1):

Services engaged in the physical transformation, particularly of goods – i.e., services that act on goods. A good example is road transport, handling and storage (including logistics).

Services engaged in the transformation of information – i.e., services that are engaged in information processing. Data processing services are a good example here.

Services engaged in the provision of knowledge based services – i.e., services for which knowledge based 'services' are their principal product. Examples include design and related services.

Services which are aimed at the transformation of people – i.e., services which act on people, providing physical and/or mental/emotional changes. A good example is care for the elderly.

Table 3.1 A Typology of Services

<i>Service Type</i>	<i>Service Description</i>	<i>Service Example</i>
1) Physical service	Services engaged in the physical transformation of goods	Road transport, handling and storage
2) Information processing service	Services engaged in the transformation of information	Data processing
3) Knowledge-creating service	Services engaged in the provision of knowledge based services	Design and related services
4) People-oriented service	Services which are aimed at the transformation of people	Care for the elderly

The advantage of this approach has been, in addition, to allow the study to investigate whether the issues (associated with, for example, skills and training), stimulating or hindering innovation, were the same or different across different type of services. Research suggests many differences exist between services, and that services should not be considered as a homogenous set of activities. This approach is intended to highlight such differences.

For these reasons, we have focused on four ‘sectors’, each of which we briefly introduce below:

Road Transport: This is self explanatory, but extends into logistics. Basically it covers activities engaged in the physical movement and distribution of goods. The ‘sector’ includes specialist road transport and distribution companies, but also divisions of companies that are primarily engaged in other activities, such as retailing.

Information Processing Services: These are firms or business units engaged in the processing of information; one manifestation of which is call centres, but we did not restrict our attention to call centres. Data-processing by banks, accountancy firms, airlines and retailers are all examples of other (non-call centre) activities that were included.²⁷ These activities are often undertaken in the back office of larger businesses. We needed to be careful, therefore, not to stray into ‘knowledge intensive’ activities, such as consultancy, although this could be tricky because businesses, such as accountants, often mix data processing and consultancy activities.

Design and Related Activities: For design our focus was on industrial product design. We sought to avoid engineering design as that is a different activity. Architecture is also different, although the inclusion of architecture was allowed if these are engaged in product design (as is often the case in Italy), or if it was not possible to identify separate product designers in the country in question. These ‘product design’ firms may be

²⁷ Regarding ‘other information processing activities’ these include operations within banks (e.g., mortgage and credit checking), insurance firms, travel agencies, airlines, utilities (meter reading, bill paying, etc.) and large retailers (for ordering and checking the flow of stock).

specialist consultancies or they may be business units within larger firms (for example, the industrial design department of car manufactures).

Care for the Elderly: These are activities, which may be supplied by the public or the private sector, provide services related to the care for the elderly. Such services may be provided on a residential basis (i.e., old persons homes, etc.) or they may be provided to the elderly within their own homes. There were also some new and more innovative services emerging in this sector, such as monitoring services (whereby an alarm is triggered if, for example, a monitoring device worn by the person signals there is some problem and attention may be needed).

The remainder of this chapter provides profiles and characteristics for each of the four 'sectors' in terms of a basic description of the size and nature of the sector or market, its pattern of growth and development and also the overall dynamics of innovation and competition. We also use some of the case study material gathered as part of the project to help illustrate innovations and related issues within these sectors.

4.2 Road Transport and Logistics

The Nature, Growth and Size of Markets

The transport and distribution sector involves the physical distribution of goods as part of the supply chain, particularly the movement of goods from suppliers to retailers and to the final consumer. It is estimated that transport services generated approximately 4% of total valued added in the EU in 1997. Total value added in the sector was equal to 235 billion € in 1999. Land transport accounted for more than 54% of the total. There are more than 800,000 transport firms in Europe, almost 60% of which are road freight transport firms. In 2001 more than 7 million people were employed in the transport sector in EU 15.

The dominant role of road freight transport is apparent in the European Union, which in some countries accounts for more than a third of the total transport employment and turnover and half of the enterprises. In France, for example, transport represents 5% of the activity within the national production system and 7.2% of the workforce. According to INSEE, the turnover of the transport sector as a whole was around 113 billion euros in 2000. Road haulage firms account for almost half of firms in the transport industry as a whole (47%). The share of the workforce is 30%. In Germany, the total land transport sector employed more than 0.5 million employees in 2000, around 1.3 % of the total employment in Germany, in almost 50,000 companies.²⁸ The total turnover was around 53 billion euro in 2000. In the UK, 833,000 people were employed directly by the transport industries in 2002, with some 60% of these employed in road transport. According to the Spanish service sector survey (INE, 2002), the transport sector in Spain employs 787,389 people, or 5% of the total working population. Freight transport occupied 440,555 people and produced a turnover of 44 billion € in the year 2000. Similarly, the majority (around 68%) of those employed directly in the freight transport sector are those involved in road haulage.

From 1970 to 1999 the total European goods transport in the 15 Member States grew from 1,338,000 to 2,960,000 million tonne km (121%). From 1985 to 1999 the average growth rate of freight transport and GDP was respectively 2.3% and 2.1% per year. The considerable growth has been almost entirely realised by road transport. In Greece, Spain, Italy and Portugal road transport performed more than 85% of all inland transport. By contrast, rail transport accounts for, at best in Europe, only around a quarter of total transport in Austria, Finland and Sweden.

Changes in manufacturing towards greater complexity, specialisation and customisation in production has increased the demand for transport. The importance of transport has increased as client firms adopt flexible production systems. For example, in Just in Time (JIT) production systems, transport services become an integral part of the production process requiring more frequent deliveries of smaller quantities of materials. The movement of freight has also been affected by the relocation of business away from city centres. For example, an important development has been the creation of regional, national and global 'hub and spoke' distribution networks. These networks permit scale economies by centralizing the handling and sorting of commodities, whereby large number of direct connections can be replaced with fewer, indirect connections. The

²⁸ Source: Statistisches Bundesamt (2002): Dienstleistungen in Deutschland, Wiesbaden, pp. 39ff.

introduction of these new transport organisational models can yield significant benefits. Thus, the Royal Mail, the UK postal provider, could not agree terms with its rail freight provider, and so it moved all its land transport to the roads. Despite this, with the implementation of its new transport strategy, it will reduce road mileage by 26% with the following actual or estimated benefits:²⁹

- The new network adopted industry 'best practice' methods; namely hub and spoke design of operations.
- Total number of lorry movements using road services are set to reduce from 8,500 to 2,500 per day.
- Across road and rail the use of diesel will drop from 149,000 litres/day to 94,000 litres/day, a 37 per cent drop.
- Use of electricity to power trains will drop from 272,000 kWh/day to nil.
- Road mileage will reduce by 20 million miles per annum; a 26.5% reduction in miles with an associated cut in fuel used of 13 per cent.
- Total daily carbon dioxide emissions for the transport network will be reduced by 30 per cent from 730,000 tonnes to 513,000 tonnes.
- The use of modern containerised aircraft will give increased aircraft speed and improved handling together with improved reliability.

Developments, such as internet-based retailing, have also brought about an expansion in local deliveries. The growth of e-commerce is expected to have a significant impact on the supply chain. One consequence of these developments is the reduction in the size of shipments and the increase in the average distance of transport due to the exploitation of scale economies. In general, there seems to be a shift towards higher quality, smaller shipment sizes, and in many cases shorter lead times and greater flexibility. However, the growth of demand for freight transport as a consequence of the expansion of e-commerce is likely to exacerbate congestion and environmental problems in urban areas. From an international perspective, globalisation of markets and the single market have also contributed to an increased demand for international freight transport. The removal of trade barriers has increased the proportion of EU production involved in intra-EU trade. The deregulation of international transport and the progressive deregulation of national road transport in many Member States are increasing competition between European road transport companies. As a result of these changes, the most important trends in transport and logistics are: shorter order cycles; smaller, more frequent and more reliable deliveries; varied delivery patterns (which in turn are related to product shelf cycle, product customisation, production/retailing strategy); closer relationship with fewer suppliers; and, outsourcing of logistics to third party managers.

In contrast to road transport, rail transport has suffered a continuous decline for the last thirty years, particularly in the area of freight. Whereas in 1970 the railways carried 21% of all freight, by 1999 the figure was 8%; by contrast, the proportion of freight going by road rose from 30% to 44% over the same period. The dominance of road transport is due partly to the greater flexibility of road haulage, allowing for point-to-point pickup and delivery, as compared with other modes such as rail. Railway transport is also a less reliable option in terms of delivery times and it does not have the flexibility of door-to-door delivery of road transport. In addition, rail transport requires longer and more complicated formalities than road haulage. Furthermore, important differences exist in

²⁹ This draws on one of our Case Studies.

the rail systems of the different member states (in terms of traffic management systems, supply of electrical current and axle load for wagons and locomotives) which means import delays and extra costs, thus ultimately making rail freight transport less competitive vis-à-vis other transport modes (European Commission 2002).

The introduction of further fuel and tax charges and road pricing, for example, by member state governments, has encouraged the use of new and intermodal transport schemes and more environmentally friendly transport options. Intermodality involving the integration of the different modes of transport has been encouraged by the European Commission in its Directive (92/106/CEE). Multimodal transport forms a major element of the European Commission White Paper, 'European Transport Policy for 2010' which seeks to shift the balance between modes of transport by revitalising the railways, promoting maritime and inland waterways transport and linking up the different modes of transport. Despite the increasing interest of multi-modal transport, its development is still slow. Its low acceptance levels is due, in part, to its inflexibility vis-à-vis road transport and the extra transshipment involved. Despite the potential for greater value added in these new developments, such as multi-modal transport, competition among modes of transport is still largely based on price. As a result, road transport remains the favourite mode of transport.

Trade and Foreign Direct Investment

The transport sector is closely linked to the expansion of trade. The Single Market has allowed the expansion particularly of intra-EU trade. 2,635 billion tonne-kilometres of freight were transported in the EU 15 in 1998, 44% of which was carried by road and 41% by sea (intra-EU). Freight transported by rail was less than 8%. The majority of transport volumes is, however, characterised by short distance movements. FDI activity abroad by EU transport enterprises (excluding auxiliary transport services) has multiplied more than five-fold during the second half of the 1990s (from 3.6 billion EUR to 19.0 billion EUR) between 1995 and 1999. The US is the largest recipient of FDI, accounting for 49% of the European FDI abroad in 1999. Moreover, the US accounted for 42% of FDI stocks in the EU in 1999.

Sector Dynamics in Competition and Innovation

The road freight market is highly fragmented, with a large number of small transport companies. The barriers to entry in the sector are very low due to low initial capital needs and little product differentiation, although the number of road transport firms is declining in some EU countries. This trend may reflect a tendency towards more cooperation between companies and greater concentration in the sector, and certain schemes, like the TROP scheme in Italy financed by the EU actively encourages this (see below). The evolution of the industry may be towards a two tier structure with a large number of small companies providing basic transport services and a limited number of larger transport firm offering more sophisticated logistics services. The composition of the sector in terms of size evidences the highly fragmented nature of the sector. For example, in France, more than 79% of road haulage firms have less than five employees. In road haulage, 39% of the turnover is generated by firms with more than 50 employees. Small firms (less than 5 employees) only account for 16 % of the turnover.

Competition in the supply of transport services is usually based on quality, costs and IT. Advances in ICTs and Intelligent Transport Systems (ITS) have enabled important improvements in transport service quality. Among these improvements are goods and parcel tracking, traffic management, fleet management, driver assistance, in-car navigation and guidance systems, global positioning systems, electronic payment systems, freight and fleet management systems and advanced vehicle control systems. Some of these developments are described below.

Intelligent Transport Systems (ITS): ITS involve the use of advanced information technologies for the increase of efficiency and cost minimisation of transport. ITS contribute to enhancing the flow of information between the drivers, the vehicular units (e.g. trucks) and transport structure (e.g. roads), in order to facilitate decision-making and satisfy customer requirements. The main elements of ITS are: data acquisition, data processing and information dissemination (Thompson, 2003).

Computerised Vehicle Routing and Scheduling (CVRS): One development of ITS is the application of Geographical Information Systems (GIS) to store, analyse and display geographic data. GIS maps are important communication tools to aid decision-making. Among the many applications of GIS is to provide a platform for the visualisation of routes and schedules for local deliveries in urban areas. GIS allows the integration of road-network information (e.g. turn restrictions, parking, speed limits, etc.) with vehicle routing and scheduling systems (CVRS). The information provided allows the estimation of minimum cost routes between customers in urban areas (Thompson, 2003).

Automatic Vehicle Location and Tracking and Tracing Goods: Another important development are satellite-based, automatic vehicle location (AVL) systems, such as global positioning systems (GPS). These methods are used to record the position of commercial vehicles in real time. AVL technologies are being used progressively more by postal services, long-haul tracking companies, security vans and shippers or hazardous goods (Thompson, 2003). These technologies can be used in combination with in-vehicle navigating systems. Information about the vehicles operations (speed, fuel levels, braking behaviour) and status is communicated to the base station in order to enhance vehicle routing and scheduling. In-vehicle technologies also contribute to improved safety performance. AVL technologies allows not only the monitoring of trucks, but also provide real time information to customers and carriers on the exact location of their shipments, enhancing reliability and quality of service. AVL also provides useful data for monitoring the performance of distribution systems, by supplying information on parameters such as delays, response times, schedule and driver performance. Another important issue is the management of vehicle utilisation according to diverse handling characteristics of products and other requirements (for example, foods need refrigerated vehicles, whereas fuels, chemicals, milk and other liquids are moved in tankers). Distributed and flexible production requirements need customized transport solutions. An important strategy for transport demand management is cooperative freight transport systems. Through cooperative agreements, multiple stakeholders can cooperatively use, operate and improve part of the transport element of their logistics activities (Taniguchi and Nemoto, 2003). The TROP scheme in Italy, noted above and centred on the Sassuola Ceramics District is a scheme to help small operators deliver better transport provision to their customers, especially small ceramics firms in the district. It allows haulage firms to share

resources and run a 'virtual fleet' of trucks, as well as better fleet management through GPS and a shared web platform.

Electronic Toll Collection: In order to reduce delays, collection costs and damage to the environment, electronic toll collection methods have been introduced to allow automatic payment by shippers. Electronic toll collection is made possible by advances in information and communication technologies, and particularly Electronic Data Interchange (EDI). Germany has sought to introduce truly electronic truck toll levy scheme on the autobahns, run by a consortium called Toll Collect, with each truck having an on-board unit (OBU) to facilitate automatic electronic processing of toll levies. The scheme has recently suffered from technical problems, but once it is running properly it will also be able to offer real-time information on traffic flows and navigation tools to truck companies and their drivers.

Logistics Terminals: In addition, developments in hub automation, with advances in automatic loading/unloading, sorting, storage, picking and packing, also enable transport service quality improvements. Logistic terminals (such as depots, distribution centres and freight terminals) help enhance the efficiency of logistics systems. Such terminals also incorporate automation technology and advanced information systems. Transportation networks can be broken down into 'node' functions (storage and deposit, handling, packaging and wrapping, loading and unloading, and information processing) and 'link' functions (pick-up and delivery and transportation). Logistics terminals connect both functions and make them interact with each other (Yamada, 2003, 66). These networks permit scale economies by centralizing the handling and sorting of commodities, whereby large number of direct connections can be replaced with fewer, indirect connections. These more integrated distribution and logistics networks involve a greater connection with other modes of transport. The management of intermodal terminals, hubs through which most of world cargo is routed through, requires the development of advanced information systems. For example in Rotterdam a project has been launched for the development of standardised electronic data interchange for the inland transport of maritime containers. The so-called EDI-LAND project allows uniform EDI-communication concerning import and export of containers throughout the logistics chain. EDI-LAND is based on EDIFACT, which is an international EDI standard, and the project has also led to the introduction of "Cargo Cards", where a smart card provides each driver with his own electronic identity (Gambardella and Rizzoli 2000). The data stored in these cards are exchanged among the different agents of the port system: terminal operators, shipping companies and forwarders. TAT Express in France runs a similar set of smart tracking, tracing and tagging systems, using EDIT and DATEX software, which allows customers to track their goods and receive notification of proof of delivery.

In general, these trends show a close interaction between technological innovation (especially using information technologies) and organisational innovation in transportation services.

4.3 Information Processing

The Nature, Growth and Size of Markets

Information processing as a sector or activity to study remains problematic, not least in terms its industrial classifications, as such activities cover a range of different categories. Moreover many information processing facilities are in stand-alone facilities so they often remain internalised activities within other service categories, such as banking and insurance, and therefore may not be so 'visible' for the purposes of understanding the size and dynamics of the activity. Firms or business units engaged in the processing of information cover what may be termed more broadly as business process outsourcing activities, which includes both 'front end' and 'back office' operations. 'Front end' activities are more labour intensive and involve direct contact with the customer. They cover a range of different activities, including: a) Call Centres; b) Technical Support Service Centres; and, c) Internet-based Processing and Support Centres. The differences between the first two, relate to the degree of technical competence that the staff are expected to deliver; whilst internet based centres differ in terms of the medium of interaction (although in the case of call centres an increasing number of queries come via email or the web). All these three activities are directly involved in collecting, processing and storing information and in answering queries and delivering a service product. These are therefore what may be termed as 'front end' information processing activities.

By contrast, there are other information processing activities that are 'back office' in nature. Aside from 'normal' administrative and clerical work, these activities include activities associated with 'data warehousing' and 'data mining' where companies store and process data, for example using store cards to analyse the shopping habits of customers. It may also include information processing support services, such as credit rating agencies. In the UK, a company called Experian has credit ratings of most UK residents and is used, for example by the internet bank Cahoot (owned by Abbey plc). A customer requesting to open a bank account and providing information to Cahoot will be subject to an automatic 'interrogation' of the Experian database as part of this information processing procedure. Thus, many 'front end' and 'back office' types of information processing activities cut across a large number of sectors, including operations within banks (e.g., mortgage and credit checking), insurance firms, travel agencies, airlines, utilities (meter reading, bill paying etc) and large retailers (for ordering and checking the flow of stock).

Amongst information processing activities, call centres have received considerable attention recently, in part because they are a fast-growing form of activity in developed economies, but also more recently because of fears over 'offshoring' and the prospect of significant retrenchment in the 'industry'. It has been estimated that around 1.3% of the European labour force worked in call centres in 2002 (Datamonitor 2000). In the US, recent estimates suggest that there are at least 82,000 call centres with approximately 1.5 million workers employed as customer contact agents, a number that is still growing rapidly. Call centres can be seen as a new organisational form whose role is to ensure the intermediation between a company and its customer (actual or potential). The essential function allotted to the call centre is the remote management of the (service) relations between a company and its customers. Call centres serve both business and consumer markets. The services offered by the call centres are multiple (Prabhaker et al. 1997): management of the customers services, telemarketing or telesales, order taking,

reservations, invoicing and account management, consultancy, complaints, recovery, technical aid, after sale service, hot-line and information collection. In terms of the direction of calls they are normally either 'inbound' only or to combine 'inbound' and 'outbound' calling. Call centres operate mainly in the financial and telecommunications sectors. However, the range of activities in call centres continues to expand across a diverse range of sectors including retail, leisure and tourism, transport, utilities and government offices and agencies. UK public services, for example, are increasingly employing call centres to provide some of their services over the telephone (see below). The UK is the country with the largest call centre market in Europe, with almost twice as many call centres as Germany or France in 2001, and with about 2% of the working population employed in them (nearly twice the EU average of 1.2%). In other countries this development is more recent but still significant, such as France and Germany, which have closely followed the development in the UK. Spain and Italy have a lower level of call centre activities but have experienced rapid growth in recent years.

The factors that help explain the growth in the call centre industry are manifold. The following pull and push factors are frequently singled out as drivers of growth in the sector:

- The increasing sophistication and availability of the computer and telephone technology enabling the managing of complex networks (Brown and Maxwell 2002).
- The liberalisation of the telecom market and increasing competition, leading to lower prices and increased bandwidth. Wider access to telephone communication and growth in use of mobile phones has increased access to call centres (Bristow et al., 2000).
- Globalisation, with call centres covering several countries, shortening of life-cycles and increased competition (Prabhaker et al., 2002).
- Corporate organisational changes related to the division between back-office, routine operations and core activities within the firm. This, increasingly, takes the form of sub-contracting or outsourcing of non-core company functions to a third party. The outsourcing market is still little developed in some countries, such as France, and more widespread in the UK.
- 24 hour society, with an increasing social demand for extending the time when services are available.
- A greater 'teleliterate' and more demanding customer base. Customer expectations about knowledge availability have increased, demanding a higher standard of services. Customers expect instant information and the accessibility of this information from the comfort of their home (Tosca, 2002).
- A key driving main driving force of call centre growth has been corporate strategy and the pursuit of low-cost competitive advantage. Call centres enable companies to manage customer relations more effectively, thus providing some competitive advantage while saving costs (Prabhaker et al., 1997)

- Changes in the public sector towards encouraging the delivery of public services via call centres and Internet facilities. For example, the UK has witnessed a number of public sector initiatives towards ‘telemediated’ services delivery (on-line services such as NHS Direct). In many countries around 10% of call centres work in public sector related services.

An important feature of call centres is their heterogeneity, in terms of activities, working conditions, skill levels, etc. It is therefore problematic to make generalisations from the frequently raised concerns on call centres, particularly related to working terms and conditions. These concerns are related to the following aspects:

- Call centres jobs are frequently depicted as highly routinised, low-grade service jobs with few career prospects. Moreover, working conditions in call centres typically involve a high degree of surveillance and monitoring, performance targets, and potential abusive calls from the public, which tend to generate significant levels of stress among employees.
- Health safety and welfare conditions in call centres are a major preoccupation for call centre workers (Health and Safety Executive 1999). Trade unions (particularly in the financial, retail, telecommunications and public services) have actively campaigned around these issues.
- Many of these centres require ‘round-the-clock’ operations, which can imply long and ‘antisocial’ working hours, often associated with high levels of part-time working.
- Due to the fact that three quarters of the workforce in call centres are female, there are a number of gender-related issues associated with their operation. There are, however, significant differences in terms of gender structure between sectors, financial services call centres, for example, employing a greater proportion of women than call centres in the IT sector (Belt et al. 1999; Belt 2002).
- Options for career progression within a call centre are more limited due to the flatter, less hierarchical structures of call centres (Belt et al. 1999).
- This lack of career progression has, in turn, led to problems of recruitment and staff retention of quality workers. The effects of stress may also be exhibited in high rates of absenteeism (Brown and Maxwell 2002).

Locational Patterns and ‘Offshoring’

Conventionally, services are delivered through the co-location of providers and clients, but the use of the telephone and internet permits the spatial separation of the service provider and the clients. This spatial separation can then be exploited by locating work in lower cost locations. The geographical pattern of call centres is highly concentrated (Bristow et al. 2000) with clustering around major cities. For example:

- In France 70 % of the call centres were concentrated in five areas: Ile de France (33%), the Nord Pas-de-Calais (11%), Provence-Alpe-Côte d'Azur (9%), Rhone-Alpes (8%) and Aquitaine (7%).
- Call centre activity in Spain is concentrated in Madrid (39% of employment in the sector) and Barcelona (29% of jobs), which together account for approximately 70% of the jobs in 2001.
- In the US, most call centres are concentrated in mid-sized Midwestern cities, and throughout the 'Sunbelt' (for example, Phoenix, Las Vegas, Tampa, Miami). The majority of such centres are inbound units that receive informational requests from customers.

Thus, in most countries call centres are located in areas close to clients, with good telecommunications infrastructure and a large pool of qualified workers available. However, other aspects are also relevant, such of cost of labour and land. However, call centre are seen as representing a significant economic development opportunity for poorer regions (Richardson and Belt 2001; Richardson et al. 2000). For example, the UK shows a different pattern to the one described above. Initially call centres tended to locate in former industrial areas, such as Leeds and Newcastle, characterised by high population densities, high female labour force participation, lower wages, and relatively high unemployment. However, recruitment and retention problems in these areas, together with new requirements for more skilled workforce, resulted in a search for other locations. Areas with existing concentration of teleservices and financial services activities and with suitable sources of labour supply benefit most from call centre growth (Bristow et al., 2000).

Sector Dynamics in Competition and Innovation

The average size of call centres varies across countries. Irish, UK and German call centres tend to be large, whilst, by contrast, the average size of call-centres is much smaller in Spain, with around 44% of call centres had less than 20 job positions, and France, where the average size of the call centres was 39 workstations per centre.

The level of technological innovations (telecommunications and data-processing), particularly the technology of automatic call distribution (ACD) systems, play a central role in the dynamics of the call centres. Some of the key innovations are:

- The introduction of IPBX (PBX, i.e. private branch exchange which allows the translation of the phone calls in Internet protocol).
- Vast databases of customer and product information, which are used to support the telephone interaction of agents with customers in both customer service and marketing activities (Miranda and Poynter 1999).
- The progressive development of the CTI (Computer Telephony Integration) system, which involves important gains of productivity thanks to the optimisation of the interaction between telephony and data processing. This system indeed makes it possible to automate the calls releases, the updates of customers data

bases and banks, the online processing of the customer's or the prospective customer's file by the tele-actor.

- The implementation of Centrex solutions which combine the functionalities of a Private Automatic Branch Exchange (PABX), of a ACD, which make it possible to reduce the withdrawal periods of the customers queuing incoming calls and automatically distributing them to the next available agent) and of a CTI. As regards distribution of the call, integration within the ACD of modules of universal queue or media blending, allow gains of productivity.
- First experiments of vocal technologies (voice recognition and synthesis), such as the development of the VoiceXML language. Interactive Voice Response (IVR) enables the automation of many standard customer service functions (Anton 2000, 125-6) .
- The rise of Customer Relations Management (CRM) technologies, especially e-CRM, has also been important in allowing companies to manage customer relationships in an organized way. CRM applications enable customer information (from sales, marketing, customer service, and support) to be captured and stored in a centralised database. The system may provide data-mining facilities to effectively manage customer relationships.

These technological innovations have been accompanied by dis-embodied, organisational changes and innovations. One area is associated with the increasing variety of different contact medium between firms and their clients which has expanded significantly over time, and firms have had to be much more flexible in the way they interact with their customers. Thus, in Italy the industry shifted from a pure “call-centre system” to a “contact-centre system”, as the traditional means of communication, like telephone, fax and mail, has been playing a less significant role compared to the more advanced applications like email, voice over IP (VoIP), text chat and so on. This helps make such centres more user-friendly and supportive to their customers. Call centres are also using more sophisticated tools and systems. Thus, Belgian call centres increasingly using web-enabled call centre tools and co-browsing tools. However, these technologies have also enabled organisational re-engineering to achieve significant labour productivity improvements, through, for example, workforce scheduling. The last thing that any call centre manager wants to see is unused capacity. Meeting the demand profile implied by the forecasts of incoming calls and contacts is a difficult combinatorial optimisation problem, especially considering that most forecasts are probabilistic. New software is being used by an increasing number of call centres so that upswings and downswings in call frequency are matched by the appropriate number and type of customer agents.

Despite, or perhaps because of, their rapid growth, it is worth considering the future of call centres. Call centres have exploited space economies (through locating in lower cost locations) and economies of standardisation (which are related to economies of scale). Although they are often criticised for alienating the service encounter, on the positive side they have also brought some advantages to customers, such as new channels of access at times which are convenient to the customer rather than to the provider (for example, 24 hour telephone banking). Call centre operations, however, face at least two major threats, which will undermine their original *raison-d'être*:

1) The first is automation, or at least self-service (see also Gershuny and Miles 1983), by customers. Thus, internet-based customer inquiries have been seen as a threat to the existence of call centres because online queries eliminate the need to wait at the end of a telephone to speak to an agent. Already it is possible for customers to fill in forms over the Internet to seek insurance quotes; the exact same questions are asked by call centre operative who then input the answers. This self-service activity by the customer removes the need for the operative and is often encouraged by a discount on the premium or ticket price. Airlines, and especially the low cost airlines, such as EasyJet, have been keen to encourage this form of self-servicing. A notable consequence of this is a further standardisation of the conditions of sale of travel tickets and insurance. The use of the Internet, therefore, as an alternative to the telephone, may pose a threat to the growth of call centres because customer contact through a website is less expensive and can be more easily automated. However, companies are still reluctant to close down telephone operations and offer internet-only services. Due to the limitations of the Internet, often the strategy is to integrate both. This relates to forecasts of call centres becoming a higher value-added customer contact centre, dealing with phone, paper and Internet requests, thus becoming less routinised and more attractive for staff. It should also be noted that call centres do not only deal with 'inboard' requests for information and transaction processing, but are also involved with more high value 'outbound' activities where the company seeks information and associated with activities such as web surveys and internet-based data collection. The Marketing Decision Group in the US is using new, sophisticated systems, such as marketing research automated systems (MRAS), Computer Edit Telephone Interviewing (CETI) systems to interview, collate, analyse and edit the information it collects from the target audience it is seeking to review.

2) The second development is access to lower cost locations in the 'developing world'. The increasing automation and standardisation of operations, coupled with improvements in digital telephone networks, software and switching technologies that allowed calls to be dealt with remotely has led to the potential relocation of these activities to countries like India. Such countries constitute attractive locations due to the lower costs and the availability of skilled workers. Recently UK firms such as Lloyds TSB, Prudential and National Rail Enquiries have announced plans to transfer call centre jobs abroad (Anon. 2003). Datamonitor predicts that, by 2008, 1 in 15 agent positions in US call centres will be outsourced to a foreign market (Read 2004). Thus, low-end, routinised, repetitive operations are under threat from lower-cost areas, automated call-handling technology, and internet-based operations.

4.4 Design and Related Activities

The Nature, Growth and Size of Markets

The 'design sector' is difficult to define and map, not least because it does not have a formal 'industry code' according to official standard industrial classifications. However, it is clear that design and related services account for a relatively small, but significant and growing share of employment and turnover across Europe and North America. The sector is characterised by a dominance of small firms, particularly in Spain and Italy. In Italy, the annual production of the design sector is around 5.1 billion euros and accounts for the 0.5% of the GDP. The sector is dominated by very small firms, each employing less than 5 people. In the UK, there were an estimated 3,700 companies working in the design consultancy sector in 2002, employing around 67,000 people and with total revenues of £5.9 billion³⁰. More generally, industrial and commercial sectors in the UK are estimated to employ 1 million people in design related functions within their businesses, with spending on design related activities being around £26.7 billion. In UK the design sector is composed of a large number of smaller consultancies: 40% of design consultancies employ no more than 5 staff and 73% of design consultancies employ 20 or fewer staff.

In the USA and Canada there are approximately 1400 industrial design companies operating. In the US, industrial design accounts for some 14,000 jobs in 1999, with about 2,000 jobs in Canada for the same period. Most industrial design companies are SMEs that employ fewer than 20 workers. According to the Industrial Design Society of America (IDSI), 30 percent of all US industrial design companies are one-person units that offer highly specialized services (the proportion for Canada is around 35 percent). Large industrial design companies (i.e. 100 employees or more) typically offer diverse sets of services, ranging from product design to architectural and civil engineering services, whilst product design is typically the primary focus of smaller design companies in both countries.

Design activity fluctuates in line with the economy as a whole, although it is subject to deeper 'boom and bust' cycles. The growth in the design industry sector is influenced by a variety of factors, particularly: a strong economy, the expansion of the internet and other technologies, and higher spending on branding, customisation and identity definition³¹. These are briefly outlined below:

- The general growth in the economy has conditioned the growth of design, since design is an integral part of most other economic activities (such as architecture, advertising, furniture, transportation, electronics, fashion/luxury goods, finance, entertainment and leisure).
- An additional factor encouraging the growth of design activity is associated with the *shortening of lead times* in products and services development and changing competitive conditions, which have placed increased emphasis on the integration of design disciplines into industrial and commercial processes. Traditionally, the relationship between manufacturing and design was seen as sequential with

³⁰ British Design Initiative/ Design Council (2002) Design Industry Valuation Survey

³¹ Creative Industries Mapping document, 2001

manufacturing taking place after design. However, changes in the competitive environment (shortening product lifecycles, flexibility, new manufacturing technologies and so on) has led to a higher degree of integration between design, manufacturing and engineering processes.

- The greater specialisation in firms' core competences and the concomitant trend towards sub-contracting of company functions has encouraged a greater demand for contracted-out design activities.
- The adoption of the internet and e-commerce has moreover brought a large new income stream to the design industry. This has had a clear impact on digital media design companies and is expected to grow further with the advent of digital television and mobile communications. Additionally, the increasing use of information technology in manufacturing and in retail and business-to-business interactions is bringing new demands to design.
- Another factor stimulating the use of design services has been the changing perception of design, innovation and product development as a source of *competitive advantage* in firms. The adoption of new technologies and the increasing competition in national and global markets makes design the key differentiating element for many firms, particularly in foreign markets.
- Additionally, the trend towards increasing *customisation* in products and services (i.e. the building, tailoring, shaping or adapting of products and services to suit specific customers) creates greater needs for design to fulfil these needs.
- Lastly, there is the issue of globalisation and the decoupling of design and production activities which is in turn encouraged by developments in IT. For example, TTPCom in the UK, involved in chipset design and product design for the mobile communications industry, rapidly expanded overseas to be able to be near to key customers and also to access talented staff. Another UK company, Atlas Industries, has 50 staff working in Vietnam producing drawings and 3D computer generated designs for buildings. The work by the Vietnamese staff is on the middle stage of building contracts, after the initial design work and before more detailed technical drawings are required by the customer.

Trade and Foreign Direct Investment

In terms of exporting activity, Britain is considered the top exporter of design worldwide. UK design firms derive a large share of their earnings from foreign market. Export earnings by design consultancies alone were estimated at £ 1.4 billion in 2002. The most successful export markets are the US, with a share of 43%, followed by France with 24% and Germany with 22% (Design Council 2002). Design is considered a key source of competitive advantage in export markets. A Design Council funded project, examining R&D, innovation and design activities in UK Queen's Award winning companies, found an important link between the rate and intensity of a firm's innovative activity and its success in export markets: 51% of export sales of the companies surveyed could be attributed to their investment in design. Over 90% of the companies considered that their international customers valued design, and 86% indicated that design was helpful to

face international competition in the UK. Three-quarters of companies considered that design helps increase the value of their products for export.

Sector Dynamics in Competition and Innovation

The sector is largely comprised of small, owner-manager firms covering different types of design expertise, although there are also a few large consultancies. The majority of design consultancies remain privately owned or subsidiaries. Partnerships are a common form of company organisation. Foreign ownership is minimal in the sector, although this gradually changing. Although consolidations and mergers have occurred in the industry, new players continuously emerge to exploit business opportunities and niche needs. Most design consultancy firms are multidisciplinary and rarely fall into a single category of design activity. This greater multi-skilling is made possible by the use of new technologies, outsourcing and freelancing. Commercial success of design firms depends on creativity and service quality rather than price. A number of new technologies and other issues are also helping to transform the industry and the way it operates. These are:

Design Support Technologies: New developments in IT and digitisation are having an impact on how design is performed (CAD, CAE, etc.; see below). Keeping abreast of technological change is essential in maintaining competitive advantage for design firms.

Rapid Prototyping: Rapid prototyping (RP) processes are used for the production of functional and technical prototypes, visualisation and marketing models. RP technologies (stereolithography and selective laser sintering, among others) allow users to create physical prototypes from 3D data. With RP techniques, “objects are created from a 3D CAD model without the use of either moulding or tooling” (Hague et al., 2003). These techniques now play an integral role in the modern product development cycle. However, and due to advances in software, companies are now moving toward electronic-design interactions, using product visualization software and virtual reality. Costs are encouraging designers to move away from physical prototypes and toward virtual prototyping.

Computer-Aided Design (CAD): Using CAD modelling, designers can display images in two or three dimensions using interactive-computer graphics. CAD allows improved visualisation of designs, comparison of alternative designs, and simulation of the operation of the product in a relatively short period of time.

Organisational Innovation: However, innovation in this design cannot be reduced to advances in information technologies or new design support technologies. Organisational innovation, particularly the development of partnerships and alliances among design firms, are becoming increasingly important. The trend towards outsourcing and the high degree of competition is having an impact on the organisational forms of the industry. Successful design depends increasingly on the ability to manage specialised and complementary expertise and capabilities from external sources, allowing firms to undertake more complex projects and master a broader range of technologies and design areas.

Sustainability: Design to meet objectives of sustainable development is becoming an important issue for design firms. Environmental problems, such as global warming, air

and noise pollution, environmental disasters and poverty is increasing the awareness on the need to adopt a more environmental friendly approach to manufacturing. An increasing number of European firms are developing products that incorporate design for sustainability. According to the Design Council, in the UK around 71% of developing products incorporate design for sustainability, whilst some 82% of products developed by Swedish firms incorporate design for sustainability. The motives for European design companies to become involved in sustainable or eco-design varies across countries. For UK and French firms, meeting customer demands is the main motivation for adopting design for sustainability. Germany and Sweden, on the other side, show a more proactive approach by pursuing sustainability to increase competitiveness. The greater involvement of these companies in sustainability can also be due to regulatory issues.

Inclusive Design: The ageing of society and an increasingly health-conscious society is posing new challenges for design. A rapidly ageing population and the increasing number of people with disabilities, have a clear impact in the new product and service development. These developments require a socially inclusive approach to design, whereby designers ensure that their products and services address the needs of the widest possible audience, irrespective of age or ability. According to a survey carried out by the UK Design Council in 2001, 35% of UK companies stated that they were developing products incorporating inclusive design. Swedish firms are similarly proactive in this areas, with 37% of companies incorporating inclusive design. Among other European countries, 22% of French companies, 16% of Dutch companies and only 12% of German companies were developing inclusively-designed products.

4.5 Care for the Elderly

The Nature, Growth and Size of Markets

Elderly care is becoming a field of increasing concern in developed countries in the light of the rapid aging of the population. The rapid growth and the characteristics of the population older than 65 has given rise to a greater awareness and importance of services and policies to face situations of dependency and need within a large part of the population. As the proportion of elderly population that is frail or disabled (and needs to be looked after) increases, there is growing concern as to how this care is to be provided. According to demographic projections made by the Eurostat (2003), on average within the EU, the volume of total health expenditure may increase by almost 0.6% per year over the next quarter century, in real terms. The higher increases will take place in Ireland, Greece, the Netherlands and Austria. Elderly care services cover a diverse range of activities, such as home care services for the elderly, day care and nursing and residential care home facilities. In addition, the way elderly care services are funded and delivered vary greatly between countries. There are clear differences between EU Member States in the legal framework of elderly care services, and in the division of responsibilities for these services, between the state, private companies, non-profit organisations, families and individuals. These differences are also reflected in the different countries there are different assumptions and policies over what the state is supposed to provide. In many countries only the health component of long term care is covered by the public sector and elderly care remains primarily a family responsibility. In general, service provision varies between institutional and home-based care services. Countries with high institutional usage (above 7% of people over aged 65) include the Netherlands and Norway, those with middle usage (from 4-6%) include France, Germany, Finland, and Belgium, whilst countries with low institutional usage (3% or less) include Italy and Spain (OECD 1998). In some countries, long-term care remains a personal or family responsibility with the state providing a safety net only for those with insufficient resources.

The factors influencing the increase in demand and cost of the long-term care sector are manifold: explanatory factors include the demographic evolution, marked by an increase in life expectancy and reduced birth rates, increasing health expectancy of the population, the changes in the provision of unpaid care by family and friends, the demand of services and the costs of care provision. In 2001, there were 62 million elderly people aged 65 and over in the EU, compared with only 34 million in 1960. In 2001, elderly people represent 16% of the total population or 24% of what is considered to be the working age population (15-64 year olds). By 2010, the latter ratio is expected to rise to 27%. Growth of the population aged 65 and over will be over 30% in Ireland, Luxembourg, Netherlands and Finland, but will remain below 20% in Belgium, Spain, Portugal and the United Kingdom. The growth of the population aged 80 or more will be as high as 70% in Greece. In sharp contrast, growth will be negligible (below 10%) in Denmark and Sweden (Eurostat 2003). By contrast, fertility rates have decreased. In the early 2000s, the total fertility rate is the lowest in Italy (1.24) and Spain (1.25), whilst Ireland has the highest rate (1.98), together with France. Meanwhile, life expectancy has increased over the last 50 years by about 10 years in total due to higher socio-economic conditions and improved medical treatment and care.

Key Developments in Care for the Elderly

In general, service provision varies between institutional and home-based care services. Some examples of key developments are provided below.

Care at Home: The most significant recent development has been to support elderly people to live in their own homes and not in nursing institutions. However, the resources devoted to home care versus institutional care varies considerably between countries (Eurostat 2003). For example, Denmark, which has made a clear priority of providing services and care to older people in their own home, has paradoxically more beds devoted to long term nursing care (725 per 100,000 inhabitants, excluding psychiatric beds) than to normal hospital care. Ireland, the UK and Germany have between 350 and 550 beds per 100,000 inhabitants. Sweden has moved most of these beds out of the health system and into social services, following reforms in the early 1990s. Belgium and France have figures that are below the EU average (between 135 and 75 beds per 100,000 inhabitants), whilst Italy and Spain are also well below the EU average (with 23 and 30 beds per 100,000 inhabitants respectively; Eurostat 2003).

Provision of Informal Care: At present, a large share of care is informal, unpaid care, provided by spouses, relatives and friends. The need for long-term care provision will depend on the supply of this unpaid care. Such care is generally provided by women, usually to their parents, parents-in-law or spouses. The factors affecting the evolution in the supply of unpaid care in the future are difficult to determine. The provision of informal care depends on cultural, political factors, such as convenience, obligation, devotion by family or friends and often less on the cost of formal care or the provision of free care. Changes in family structures (smaller families, greater incidence of divorces, falls in birth rates, higher divorce rates, re-marriage, greater family mobility and less living together of families across generations), social (changes in working life female workforce participation) and cultural factors (how ingrained it is in society to care for the older members of the family), will be likely to affect the formal/informal care relation.

Use of Services: The type of services provided and the use of these services are other elements that affect the demand for long-term care. The quality of service delivery is influenced by personal preferences and expectations about the quality of that care and by the income evolution of elderly people (how much they are willing to pay for it). People increasingly expect better standards as regards accommodation (single rooms, en-suite facilities) and services. It is not clear however what the preferences of older people will be as their incomes rise; whether they would consume more elements of long-term care as a 'luxury good', or whether they would be willing to pay what is only absolutely necessary and opt instead to spend their money on technological devices and adaptations that decrease their level of dependency on caretakers.

Health Expectancy: The health of older people is a key determinant of the need for long-term care. This is marked by the health of individuals, public health generally and material standards of life. With people living longer, they are liable to become more prone to suffering from debilitating conditions, such as cancer, heart disease diabetes, dementia, severe disability and other degenerative illnesses related to ageing. This will involve a rise in the cost and resources needed for care, which will be unlikely to be

coped by informal carers will be unable to provide on their own and this will also increase the need of formal care.

Care Costs: All the developments listed above, will have an impact on the costs of the service. Along with the volume of people involved, the trend towards increased life expectancy will imply that the elderly will place more demands on the health system over an increasing period. Additionally, greater incidence of illnesses related to aging and involving more expensive treatment or specialised care are likely to take place, causing costs to rise. Long-term care is a labour intensive sector; wage costs typically account for about two-thirds of the costs of long-term care.

Sector Dynamics in Competition and Innovation

Since care for the elderly is very labour intensive and can in most aspects not be standardised or automated by technical equipment, the potential for innovations might appear to be rather limited. However, the use of technology can enable older people to be cared for more easily or to live safely in their own homes. Examples can be unobtrusive sensors on walls, ceilings, beds, lights, appliances, infrared (IR) signals and/or radio frequency (RF) identification badges, devices for opening windows, turning taps on and off, raising and lowering work surfaces, setting alarms, turning lights on and off. Also mechanisms for surveillance and monitoring of whether elderly people need help, and interface and communication devices with care providers, such as tele-assistance services, or remote support and monitoring services, are significant developments being promoted currently.

This said, potentially the most significant impact of innovation in the long-term care sector will stem from organisational innovations using these new technologies in novel ways to achieve better and more sustained care for elderly people. Thus Canterbury Woods is a continuing care retirement community in Williamsville, New York which is run by the Episcopal Church Home and Affiliates Group (what might be more broadly classified as a Non-Governmental Organisation (NGO)) headquartered in Buffalo. The Group and Canterbury Woods has been highly successful in developing new organisational methods and routines to help support the aged. It has, for example, developed three levels of interchangeable assistance dependent on the care needs of the residents. It has also introduced various financial innovations associated with care schemes, such as Life Care, dovetailed to the requirements of the residents. It also runs short term rehabilitation services for its residents, and has high levels of customer satisfaction underpinned by selected training programmes for its staff. Similarly, in France there have also been successful developments in the creation of local communities for the elderly. Maison d'Accueil pour Personnes Agées Dépendantes (MAPAD) has run residential facilities for dependent elderly in Aulnoye Valenciennes and has created a 'district community house' that provides not only good accommodation, but also provides active support, care and socialisation activities for its residents.

There are problems with innovations in the care for the elderly 'sector'. There is limited potential for labour-saving innovations by using more intensively ICT supported technologies, which allow to supervise the persons in need of care and their needs. Innovation to increase the quality of care occurs more often by developing advanced

methods of care, which integrate better the needs and wishes of the persons in need of care. Furthermore, the companies or organisations providing services for the elderly both in nursing homes or at home may diversify their service range. Thus, nursing services can be expanded in order to serve also family members of the persons in need of care. Many of these innovations depend on the regulatory framework, which defines also the requirements for public subsidies. Since care services are very labour intensive, they are very expensive and will become even more expensive due to the demographic development. This price increase will restrict the potential demand. With public financial support, however, critical masses may be generated, which would give incentives to service providers to expand their service range. Considering the tight situation of the public budgets and the trend towards the impoverishment of many elderly people, the increasing need for care is unlikely to be complemented by sufficient financial resources. This pressure may lead, on the other hand, to cost-saving innovations and the danger that the quality of care will be decreased.

In North America innovation within this sector is seen as most likely coming from regulatory change; for example, via better financial systems to cope with projected expenditure needs. Tax deductibility for private insurance premiums would expand the number of people seeking health-care coverage. Within the elderly care industry itself, perhaps the greatest scope for innovation lies in delivering service care at home. Thus schemes are being established whereby qualified professionals visit the homes of elderly citizens and where care advisers then train elderly clients in the art of 'home survival'. The ultimate goal is to cut disability rates and reduce nursing home occupancy levels.

5. Innovation & Change in Four Service ‘Sectors’ Part 2 - Survey Findings

5.1 Introduction to the Survey and Methods Used

In the previous chapter, we outlined the four sectors selected for this study. We also outlined the rationale for that focus; essentially, our aim was to focus on activities that are, to some extent, representative of the diversity of services. We also explored the context and some of the innovation activities being undertaken within these sectors in Chapter 4. It should be clear that all of the sectors have innovative activities, which include not only technological but also organisational and relational forms of change. The aim of this chapter is to now explore the results of the questionnaire survey which we undertook as part of the project. In particular, we shall outline some of the basic characteristics concerning the extent and pattern of innovation across the four sectors, as uncovered by the survey. We will begin, however, by outlining the methodology used to conduct the survey.

Innovation is, by its very nature, highly diversified. A large scale survey of innovative behaviour is necessarily reductive. For practical purposes we were forced to ask structured questions, with predefined answers. Moreover, in order to achieve the desired sample (1,300 responses) it was necessary to keep the questionnaire short. We therefore designed a questionnaire that asked 17 questions over four pages. We considered that the questionnaire could be answered within 15 minutes, which was short enough not to place too high a burden on the respondents.

The survey was conducted by telephone (although some questionnaires were sent and returned by fax or email following telephone contact). The original version of the questionnaire was in English, and this version was used in the UK, Ireland, the Netherlands, Denmark, Sweden and Finland as well as in the United States and Canada. A Spanish version was used in Spain, and a Greek version in Greece. The Spanish and English versions were used in Portugal. The French partner in this study used a French version of the questionnaire in France, Belgium and Luxembourg. The German partner used a German version in Germany and Austria, and the Italian partner used an Italian version in Italy.

Each partner was responsible for the assembly of their own population lists and for their own sampling strategy. A significant difficulty with this survey was the construction of the population lists of organisations which should be targeted (i.e., the nature of the sampling frame, etc.). This was not least because, with the exception of ‘road transport’ our ‘sectors’ were not easily defined, and the use of official classifications such as NACE or U.S. SIC was unlikely to lead to the inclusion of firms or other organisations that were solely (or even largely) engaged in the activities the survey was interested in. Moreover, it was appropriate to include sub-units of larger enterprises that were engaged in activities we were interested in, such as the data processing departments of banks, or the transport departments of large retailers. We did not aim, therefore, to be strictly scientific, but rather more exploratory in method. A ‘strictly scientific’ approach would be likely to focus on a ‘representative sample’ of businesses in each sector, but in sectors like transport and care for the elderly we considered that this would not give rise to

interesting samples, as single site residential care homes and small independent trucking firms are arguably the representative firms in these sectors. We therefore sought to over sample (relative to the population) amongst the larger and ‘more interesting’ businesses in each sector.³² Our results should not therefore be taken as representative of these sectors. Rather than be representative, we were looking to explore the extent to which the methodology developed was ‘workable’, and to find evidence of diversity within the sectors we had selected to study. With respect to the latter, it is the relationship between responses that is more important than the levels of each phenomenon investigated.

There were several novel (or innovative) aspects of this survey which should be highlighted.

1. We tried to keep the language of the survey simple, partly to reduce problems inherent in translating the concepts from one language to another, but in particular we sought to avoid using the term ‘innovation’ in the early part of the questionnaire. Instead, we asked the respondents about the extent to which various aspects of their business had ‘changed’. We avoided the term ‘innovation’ in this part of the survey for two reasons. Firstly, because it has become a very loaded concept, which would have required a definition (which creates as many problems as it solves). Secondly, because innovations tend to be associated with discrete events, which may be harder to identify in services, where change tends to be more continuous. Although the relationship between ‘change’ and ‘innovation’ is contentious, we felt the advantages of avoiding the term innovation outweighed the disadvantages.
2. Apart from ‘changes’ to the products or services provided and the means of production and delivery, we also explored changes to the technologies and skills of the organisation, as well as to its organisation, and its inter-relations with customers and other businesses. Our aim was to extend the investigation of innovation beyond the narrow confines of ‘product and process innovation’. The need to do this has been highlighted by the findings presented earlier in the analysis of the Innobarometer data concerning the significance of organisational innovation in services.
3. The survey also included questions about the nature of the services provided and the extent of competition faced by the firms. These aspects were included because we were interested in trying to understand innovation (or ‘change’) in its wider context rather than ‘counting innovations’ and comparing innovation rates.
4. The surveying of ‘care for the elderly’ activities is an important step towards surveying this type of activity, which has not yet been covered by the Community Innovation Survey (CIS) due to perceived difficulties with the application of the CIS methodology. This sector was not sampled in the United States and Canada, nor in several smaller European countries. With regard to the US and Canada, this was for two reasons. Firstly, it was thought difficult by our US partner to find any reasonable sample of elderly care businesses in the United States,

³² In any case, it is very difficult to achieve a ‘representative sample’ with a voluntary survey. Businesses have to be persuaded to participate, and participation is very likely to be biased towards more innovative businesses, as these are more likely to want to tell researchers about their innovation efforts.

particularly given the strong regulatory impact on these businesses and the relatively small sample size that was to be generated. Secondly, given the total number of responses to be generated (300), it was thought better to gain larger samples in three sectors rather than smaller samples in four. With regard to the smaller European countries, this was because it was difficult to identify ‘care for the elderly businesses’, particularly from outside the country concerned.

5. The surveying of innovation in the United States is also a novelty. To our knowledge this is the first ‘innovation survey’ to have been conducted in the United States.

Table 5.1 shows the total number of responses gathered for each of the four sectors and in each of the various ‘country groups’.

Table 5.1 The Response to the Survey by Sector and Country Group

	Road Transport	Information Processing	Design & Related Activities	Care for the Elderly
France, Belgium & Luxembourg ¹	49	52	61	67
Germany and Austria ²	71	44	76	21
Italy ³	33	41	30	42
UK and Ireland ⁴	50	50	54	50
Spain and Portugal ⁵	42	32	37	28
Other Smaller EU Countries ⁶	16	22	39	0
United States and Canada ⁷	100	100	102	0
Total	361	341	399	208

‘Other Smaller EU Countries’ are the Netherlands, Denmark, Sweden, Finland & Greece

1. Surveying undertaken by the French project partner (total sample = 229)
2. Surveying undertaken by the German project partner (total sample = 212)
3. Surveying undertaken by the Italian project partner (total sample = 146)
4. Surveying undertaken by the UK project partner (total sample = 204)
5. Surveying undertaken by the UK project partner (total sample = 139)
6. Surveying undertaken by the UK project partner (total sample = 77)
7. Surveying undertaken by the US project partner (total sample = 302)

5.2 Road Transport and Logistics

Contextualisation

Most of the road transport and logistics businesses surveyed were independent companies; although a substantial minority (29%) were subsidiaries or divisions of wider company groups. The vast majority were established before 1998, but the businesses ranged widely in size, from those with only one or two employees to those with thousands. Roughly two thirds of sample were businesses with 50 or more employees, with one third of smaller businesses. Most of the businesses had the ambition to grow larger over the next five years, although the majority of these sought to grow moderately rather than substantially.

Table 5.2 Road Transport: Ownership, Size, Age and Growth Objectives

Ownership of Business:		Year of Establishment:	
Independent Firm / Sole Trader	71%	Before 1998	93%
Subsidiary*	29%	1998-2000	5%
Not for Profit Organization#	1%	2001-2003	3%
Total	100%	Total	100%
Number of Valid Responses		Number of Valid Responses	
359		361	
Business Size (Total Employment):		Growth Objective (next 5 years):	
1 or 2	2%	Become Smaller	3%
3 to 9	10%	Remain Same Size	14%
10 to 19	9%	Grow Moderately	61%
20 to 49	13%	Grow Substantially	22%
50 to 249	36%		
250+	28%		
Total	100%	Total	100%
Number of Valid Responses		Number of Valid Responses	
360		358	

* Wholly or partially owned by another business; # or Part Thereof

Table 5.3 Road Transport: Markets and Competition

Location of Customers:		Number of Competitors and New Competitors	Number of Competitors	New Competitors#
Mainly local*	5%	None	1%	18%
Mainly regional	27%	One or Two	1%	19%
Mainly national	33%	A Few (3 or 4)	13%	21%
Across the EU/NAFTA	19%	Several (5, 6, 7)	15%	17%
Spread across the world	15%	Many	70%	25%
Total	100%	Total	100%	100%
Number of Responses		Number of Responses		
361		360		351

* within 50 kilometres or 30 mile radius

which entered the 'area of business' in recent years

With regard to the location of their customers, most businesses served regional or national markets, although around a third were highly internationalised. In terms of competition, most of the surveyed businesses declared they faced many competitors, and

very few had no or one or two competitors. Interestingly, there was much greater variety in the extent to which the businesses recognised new competitors had entered their area of business in recent years – some businesses stated that no new competitors had entered, whilst others declared many new competitors had entered their markets.

The Nature of the Services Provided and the Competitive Basis of the Businesses

Most of the transport service businesses that responded to the survey provided customised services (defined as services that are changed for each individual customer), although most also provided standardised services (defined as services which do not change between individual customers). Only 3% provided ‘only standardised services’; 11% supplied ‘only customised services’. 12% provided ‘mainly standardised’ services’, whilst 30% supplied ‘mainly customised services’. The remaining 44% provided a mixture of standardised and customised services.

The businesses were asked to grade the importance (between ‘of no importance’ and ‘of high importance’) of 16 factors that might relate to the ‘success’ of their business. The first thing to note is the high number of factors they tended to identify as ‘of high importance’: the median business identified 9 of the 16 factors as being of high importance, and only 10% identified 3 or fewer as of high importance to the success of their business. This might suggest the businesses do not really know the key success factors, or it might suggest that even in an activity which some might regard as relatively simple, finding a ‘recipe for success’ is difficult, as it requires paying attention to many different competitive dimensions.

Figure 5.1 Road Transport: Factors Important to Business Success

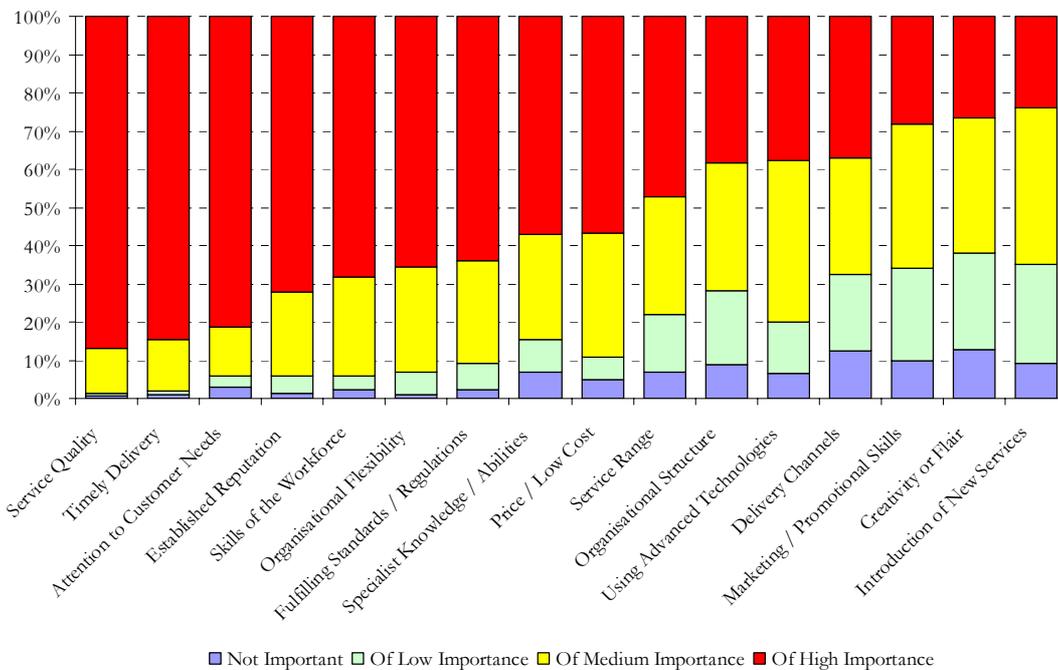


Figure 5.1 ranks the factors by the extent to which the businesses regarded these as ‘of high importance’ to their success. ‘Service quality’ and ‘rapid and timely delivery’ were, perhaps unsurprisingly for road transport, the most widely recognised factors of ‘high importance’ to the businesses’ success. We do not intend to discuss the response in detail, but rather pick out a few observations. One is what appears to be a marked reluctance to consider almost anything as ‘not important’. Even those factors which were most commonly described as ‘not important’ were only identified as such by around 10% of the businesses. A second observation is that the introduction of new services ranks last, being identified as a factor of ‘high importance’ by only around a quarter of the businesses. Interestingly the use of advanced technologies was more widely regarded as important, being identified as very important by nearly two-fifths of the respondents, whilst two-thirds identified the skills of their workforce as a factor of high importance.

A factor analysis conducted on these results found four factors, one associated with the introduction of new services and the use of new or advanced technologies as well as creativity and flair and having specialist knowledge and abilities. The second related to the skills of the workforce and maintaining organisational flexibility, whilst the third related primarily to having a variety of delivery channels available (and to a lesser extent to providing a full or broad range of services). The last factor related to the quality of services provided, and to the rapid or timely delivery of services. What this suggests is that the more explicit forms of innovation, which would appear to be associated primarily with the first factor, are only part of the story, and more subtle forms of innovation and change, which are associated with the other three factors are also highly significant, even though they are more easily overlooked.

The Extent of Change

We now explore the pattern and extent of ‘change’ amongst the road transport and logistics businesses. Figure 5.2 shows the extent to which these businesses saw various dimensions of their activities as having changed over the last three years. The first three dimensions of change cover what we term CIS (or ‘technological’) types of innovation: these types of innovation are asked about in the European Community Innovation Survey (CIS) questionnaires. They concern:

- changes to the products or services that the business provides;
- changes to the means of producing services; and,
- changes to the means of delivering services.

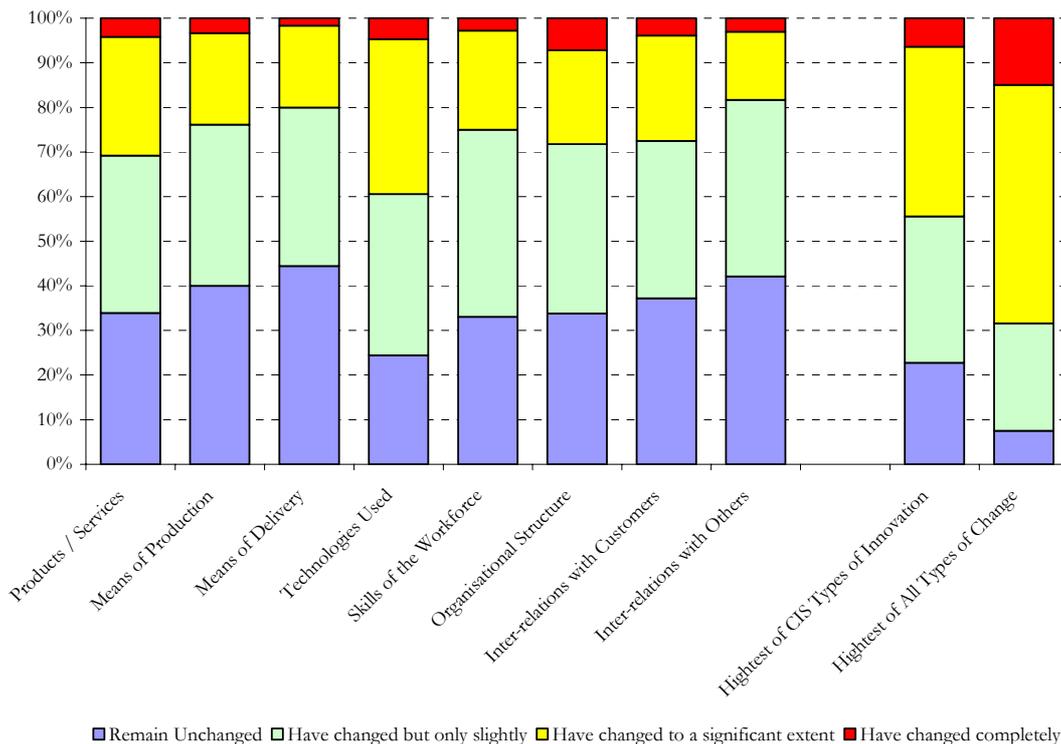
We also asked about five other types of change which are not investigated directly by the CIS. These concern:

- changes to the technologies used to produce or deliver services;
- changes to the skills of the workforce used to produce or deliver services
- changes to the organisational structure of the business
- changes to the way in which the business inter-relates with its customers (e.g., through the formation of collaborative partnerships, etc)
- changes to the way in which the business inter-relates with other businesses (e.g., through the formation of collaborative partnerships, etc)

Figure 5.2 shows the extent of change reported in these various dimensions of the businesses' activities. The greatest change was reported in the technologies used, with almost 40% of the respondents reporting significant or complete change. Around 30% reported significant or complete change in the services provided, whilst slightly smaller proportions reported significant or complete change in their organisational structure and inter-relations with customers. Around 25% reported significant or complete change to the processes of service production, and a similar proportion reported this extent of change in the skills of the workforce used to produce or deliver services. Finally, around 20% reported significant or complete change in the means of service delivery and in their inter-relations with other businesses (excluding customers).

Looking at the greatest extent of change, about 6% of the businesses reported complete change in at least one of the three CIS-types of innovation: products, processes of production and/or processes service delivery. A further 38% reported significant change in at least one of these dimensions, whilst a third reported (at most) only slight change, and the final 23% reported no change. Because the survey cannot claim to be representative, we should treat these distributions with care. We are more interested in comparing the levels and in the relationships between the various answers rather than each individual level of innovation or change reported.

Figure 5.2 Road Transport: 'Change' Across Various Dimensions



If we take all eight forms of change and select the greatest extent of change reported, we find that 15% of the businesses reported complete change in at least one of these dimensions, whilst over half (53%) reported significant change. A further quarter (24%) reported (at most) only a slight change to one or more of these dimensions, whilst the remaining 7% reported no change at all. The difference between the greatest extent of change reported by the CIS-types of change and that found when all types of change are considered obviously relates to the types of change not included in the CIS. This shows

the significance of organisational and relational change over and above ‘technological innovation’ in road transport service businesses.

A factor analysis on these dimensions of change found two factors for the road transport respondents: the first relating to the first five dimensions of change, the second to the last three. Essentially, these can be seen as technological versus organisational-relational forms of change.

Technologies and Change

New technologies are clearly important to many of the road transport businesses we surveyed. Almost half (46%) of them declared that investing in new technologies was of crucial importance to their business, with a further third (34%) declaring such investments to be ‘very important’. Only 6% claimed investing in new technologies was ‘not important’, whilst the remaining 14% claimed such investments were of ‘low importance’.

Figure 5.3 Road Transport: Technologies and Other Forms of Change

		CIS types of Change						All Other Types of Change			
		0	1	2	4			0	1	2	4
Tech-nologies	0	13%		18%		Tech-nologies	0	8%		29%	
	1	29%					1	24%			
	2	13%		24%			2	6%		29%	
	4				3%		4				4%

Notes:

CIS – Types of Innovation Identified by the European Community Innovation Surveys (CIS) – i.e., Product and Process Innovation – including service products and production and delivery processes.

Non-CIS – Types of Innovation NOT identified by the European Community Innovation Surveys (CIS), including changes in skills of workforce, changes in technologies, changes in organisational structure and changes in inter-relations with other businesses and customers.

0 – Unchanged; 1 – Only Slightly Changed; 2 – Changed to a Significant Extent; 4 – Changed Completely

To explore further the significance of technological change to the wider innovation activities of the firm, we present two cross tabulations (Figure 5.23). The first shows the extent of change to the technologies used against the greatest extent of change in the service ‘products’ provided, the means of production and the means of delivery (i.e., the three CIS-types of innovation). This shows that whilst most responses lay on the (\) diagonal indicating a broad correlation between change in technologies and change in the products or services provided and/or the means of production and/or the means of delivery, a substantial minority of the responses lay off the diagonal. A first ‘off diagonal’ group was the 13% of respondents that indicated significant changes to the technologies used, but at most only minor changes to the services provided and/or the means of production and/or the means of delivery. Amongst this group, the new technologies may have been related to other forms of change, such as organisational or relational change. The second group of ‘off diagonal’ responses constituted 18% of the total. These reported significant or complete change to at least one of the following: the services provided, the means of producing services, and the means of delivering services.

However, these firms apparently made these changes without changing the significantly the technologies used to produce or deliver services.

The second cross-tabulation shows the extent of change to the technologies used against the greatest extent of change in all of the other seven dimensions of change we have presented above. As before, this shows the majority of firms lay on the diagonal – amongst these there is an apparent connection between the extent of change in the technologies used and the extent of change in at least one of the other dimensions of change assessed above. Again, however, there are two off-diagonal groups. The first is small at 6%. This is the group amongst which the extent of change to technologies is complete or significant, but which report at most only slight change to any of the other forms of change. Quite how the significantly changed technologies have impacted on these businesses remains a mystery. The second group of ‘off diagonal’ respondents is substantial, at almost 30% of the responses. This is the group of respondents which reported complete or significant change to one or more of the other seven dimensions of innovation assessed above, whilst claiming at most only a slight change to the technologies used to produce or deliver services. This shows that whilst technologies are very often an integral part of change in services, they are not always necessary for innovation in services. This ‘non-technological’ dimensions of service innovation deserves fuller attention in the future.

Skills, Technologies and Change

Alongside investing in new technologies, many of the road transport businesses that participated in our survey reported that it was either ‘crucial’ or ‘very important’ (44%) to train or retrain existing staff in the business. A further third regarded such training as of ‘medium importance’. Only 7% declared the training or retraining of existing staff to be ‘not important’, whilst 14% declared this to be of ‘low importance’. Although we did not ask more detailed questions, such as the number of training days per employee, this clearly suggests a dynamic environment with respect to the skills mix necessary for these businesses to complete. The need to train new staff entering into the business was even more widely appreciated. Almost two thirds (64%) of the respondents claimed this was ‘crucial’ or ‘very important’, whilst a further 22% stated it was of ‘medium importance’. Just 5% thought the training of new staff was ‘not important’ and 8% declared it to be of ‘low importance’.

Figure 5.4 shows the relationship between the extent to which the businesses reported change in the technologies they used to produce or deliver services and the importance they attach to training of existing and new staff. There are two notable aspects of how these distributions inter-relate. Firstly, there appears to be a close connection between the need for training and changes in the technologies used: only 4% of businesses stated that the technologies used had changed significantly or completely but also claimed the training or retraining of existing staff was of no or low importance. Only 2% made this claim with regard to new staff. This suggests significant technological change is usually accompanied by a need to change or adapt the skills of the organisation.

However, the second notable finding suggests that changing or upgrading skills is also often necessary even in the absence of technological change. For it is notable that a large proportion of respondents claimed training to be ‘very important or crucial’ to their

business even though they also reported at most only a slight change in the technologies used to produce or deliver services. Over a fifth of the respondents made this combination of answers with respect to the training of existing staff, and nearly two-fifths did the same with regard to the training of new staff.

Figure 5.4 Change in Technologies Used & Training of Existing & New Staff

		Training Existing Staff						Training New Staff			
		0	1	2	4			0	1	2	4
Tech- nologies	0	5%		21%	22%	Tech- nologies	0	4%		12%	37%
	1		12%				1		7%		
	2			14%	22%		2			9%	28%
	4		4%				4		2%		

Notes:

Technologies = Extent of Change in Technologies Used: 0 – Unchanged; 1 – Only Slightly Changed; 2 – Changed to a Significant Extent; 4 – Changed Completely
 Training ... = Importance of Training: 0 – Not Important; 1 – Of Low Importance; 2 – Of Medium Importance; 4 – Crucial / Very Important

Conclusions

Our analysis of the survey findings with respect to the road transport businesses highlights a number of interim conclusions.

1. Competing in road transport activities appears to require that attention be paid to multiple aspects of the services provided. Notable here is the emphasis on service quality. Also notable is the low grading given to the importance of introducing new services. This suggests that continuous forms of largely ‘hidden innovation’ are likely to be more significant than explicit innovation through the introduction of new services. Also notable is the relatively high grading given to the importance of workforce skills.
2. In terms of the extent of ‘change’ within the businesses, the greatest extent of change was found in the technologies used – although the introduction and use of new technologies did not rank highly as a contributor to the success of most of the businesses that responded to the survey.
3. Changes in the technologies used tended to be associated with other forms of change; but equally not all forms of change (such as organisational and relation change) was dependent on new technologies.
4. Changes in the technologies used were closely related to changes in the skills required, and thereby to the training and retraining of staff. This suggests that new technologies are not easily absorbed into road transport businesses, and that therefore these businesses should not be regarded as mere passive adopters of technologies.

5.3 Information Processing

Contextualisation

The ownership profile of the information processing businesses was similar to that of the road transport businesses in that whilst most were independent businesses a substantial minority were subsidiaries or divisions of larger company groups. The majority of the businesses were established before 1998, although a third were more recently established. The businesses also they varied widely in size. Roughly 30% had fewer than 10 employees, whilst 12% had 250 or more employees. There was a strong growth orientation to these businesses – more than 90% sought to grow in the next five years, and a large proportion of these sought substantial rather than moderate growth.

Table 5.4 Information Processing: Ownership, Size, Age and Growth Objectives

Ownership of Business:		Year of Establishment:	
Independent Firm / Sole Trader	73%	Before 1998	68%
Subsidiary*	24%	1998-2000	20%
Not for Profit Organization#	3%	2001-2003	12%
Total	100%	Total	100%
Number of Valid Responses		Number of Valid Responses	
339		336	
Business Size (Total Employment):		Growth Objective (next 5 years):	
1 or 2	7%	Become Smaller	1%
3 to 9	22%	Remain Same Size	9%
10 to 19	14%	Grow Moderately	52%
20 to 49	18%	Grow Substantially	37%
50 to 249	26%		
250+	12%		
Total	100%	Total	100%
Number of Valid Responses		Number of Valid Responses	
336		335	

* Wholly or partially owned by another business; # or Part Thereof

Table 5.5 Information Processing: Markets and Competition

Location of Customers:		Number of Competitors and New Competitors	Number of Competitors	New Competitors#
Mainly local*	8%	None	6%	23%
Mainly regional	20%	One or Two	8%	20%
Mainly national	55%	A Few (3 or 4)	15%	20%
Across the EU/NAFTA	9%	Several (5, 6, 7)	17%	12%
Spread across the world	8%	Many	54%	25%
Total	100%	Total	100%	100%
Number of Responses		Number of Responses		
340		336		329

* within 50 kilometres or 30 mile radius

which entered the 'area of business' in recent years

Most of these businesses served national markets, although a quarter served mainly local or regional markets, whilst 9% served markets spread across the European Union or North America, and 8% served markets spread across the world. As with the road transport businesses, most of the information processing respondents claimed they had many competitors; only 14% had no or one or two competitors. Again, however, there was a more even distribution in terms of the extent to which the businesses recognised new competitors having entered their area of business in recent years.

The Nature of the Services Provided and the Competitive Basis of the Businesses

Most of the information processing businesses that responded to the survey provided customised services (defined as services that are changed for each individual customer), although again most also provided standardised services (defined as services which do not change between individual customers). Only 3% provided ‘only standardised services’, 20% supplied ‘only customised services’. 9% supplied ‘mainly standardised services’, whilst 38% provided ‘mainly customised services’. The remaining 30% provided a mixture of standardised and customised services.

The businesses were asked to grade between ‘of no importance’ and ‘of high importance’ 16 factors that might relate to their ‘success’. Again, it is notable that the businesses tended to identify a large number of factors as being of ‘of high importance’: the median business identified 8 of the 16 factors as being of high importance, and less than 10% identified 3 or fewer as of high importance to their success. This suggests that finding a ‘recipe for business success’ is difficult, as it requires attention to many different competitive dimensions.

Figure 5.5 Information Processing: Factors Important to Business Success

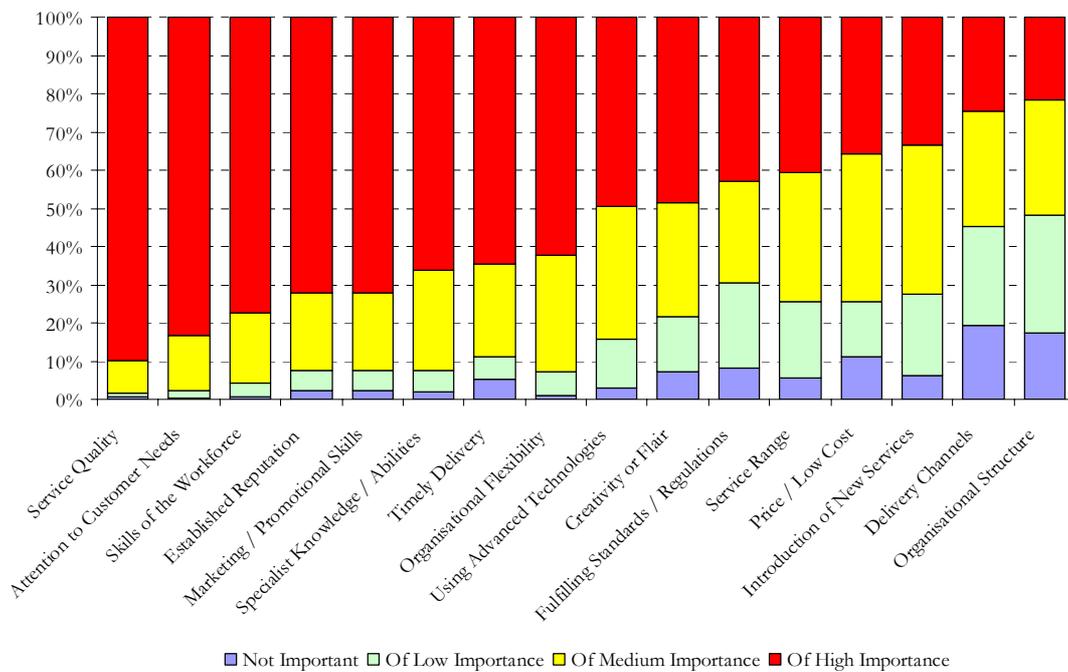


Figure 5.5 ranks the factors by the extent to which the businesses agreed they were 'of high importance' to their success. As with road transport, service quality was the most widely recognised factor of 'high importance' to their success, followed by paying attention to individual customer needs, with the skills of the management and workforce third. Again, we do not intend to discuss the response in detail, but rather pick out a few observations. Again, there was a marked reluctance to consider almost anything of low or no importance – only having a variety of delivery channels and the organisational structure of the business were thought by around half the businesses to be no more than of 'low importance'. The introduction and use advanced technologies ranked around the middle of these factors, and was very rarely described as 'not important'. The introduction of new services, meanwhile, was amongst the least likely of these factors to be identified as being of 'high importance'.

A factor analysis conducted on these results found four factors. The first factor related strongly to the skills of the management and workforce, whilst the second related strongly to paying attention to individual customer needs. The third factor related to the introduction of new service and creativity and flair in the services provided. The final factor related most strongly to having a variety of delivery channels, providing a full or broad range of services, and the rapid or timely delivery of services. The identification of these four factors suggests that there are several dimensions to business success in information processing, and new service introduction, which is the most explicit form of innovation, is primarily associated with one of these dimensions. More subtle forms of innovation will be associated with the other dimensions, although these are easily overlooked. Combined with the emphasis on providing customised services, this suggests a dynamic competitive environment characterised by continuous change, rather than by innovation in intermittent jumps or steps.

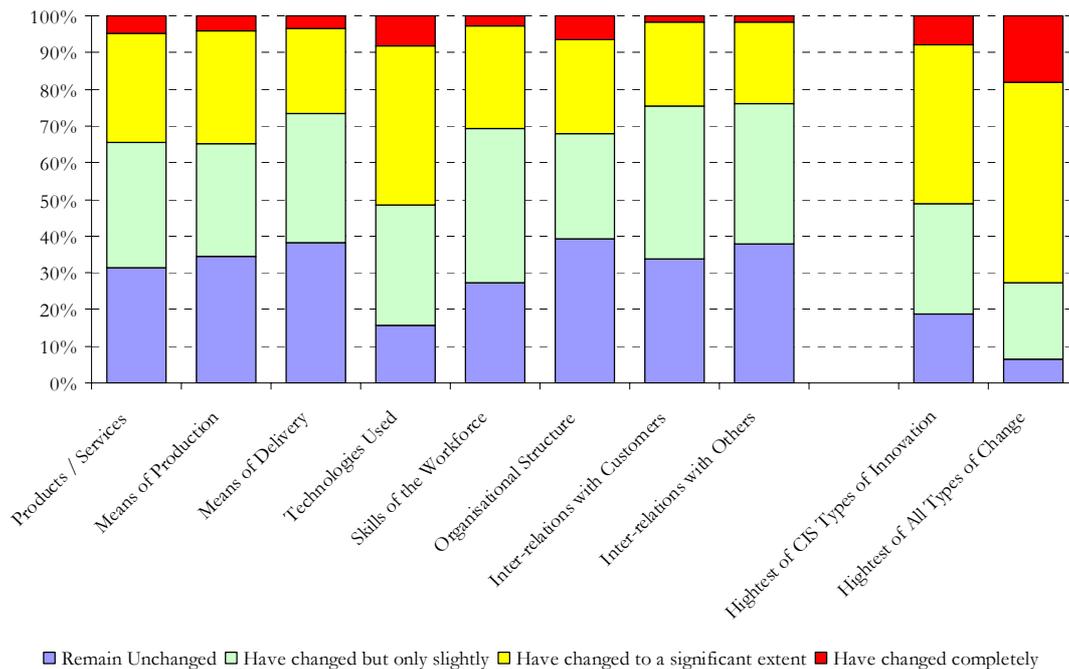
The Extent of Change in Information Processing Businesses

Figure 5.6 shows the extent of change reported in the various dimensions of the information processing businesses' activities. As with road transport businesses, the greatest change was reported in the technologies used, with more than half of the respondents reporting significant or complete change. Around 35% of the businesses reported significant or complete change in the services or products provided and to the means of producing services, whilst just over 30% reported significant or complete change to their organisational structure and the skills of the workforce. Around a quarter reported significant or complete change to the processes of service delivery and inter-relations with customers and other businesses.

Looking at the greatest extent of change, about 8% of the businesses reported complete change in at least one of the three CIS-types of innovation: products, processes of production and/or processes service delivery. A further 44% reported significant change in at least one of these dimensions, whilst 30% reported (at most) only slight change, and the final fifth (19%) reported no change. Again, because the survey cannot claim to be representative, we should treat these distributions with care. We are more interested in the relative levels and the relationships between the various answers, rather than the absolute levels of innovation or change reported.

If we take all eight forms of change and select the greatest extent of change reported, we find that 18% of the businesses reported complete change in at least one of these dimensions, whilst over half (55%) reported significant change. A further fifth (21%) reported (at most) only a slight change to one or more of these dimensions, and the remaining 7% reported no change at all. This shows the majority of the businesses claimed to have experienced substantial change in at least one of these dimensions, but also that organisational and relational change is at least as widespread as ‘technological innovation’ in the sense of the CIS – i.e., as new or significantly changed products and processes of production or delivery.

Figure 5.6 Information Processing: Change Across Various Dimensions



A factor analysis on these dimensions of change found two factors for the information processing sector, and like the road transport respondents, this divided between technological (the first five form of change) versus organisational-relational forms of change (the last three forms of change), although ‘skills of the workforce’ loaded equally onto both factors.

Technologies and Change

New technologies appear to be even more important to the data processing businesses we surveyed than they were to the road transport businesses. For almost two-thirds (63%) of them declared that investing in new technologies was of ‘very important’ or crucial to their business, with a further 29% declared such investments to be of ‘medium importance’. Just 3% claimed investing in new technologies was ‘not important’, whilst the remaining 5% claimed such investments were of ‘low importance’. To explore further the significance of technological change to the wider innovation activities of the firm, we present two cross tabulations. The first shows the extent of changes to the technologies used against the greatest extent of change in the service ‘products’ provided, the means of production and the means of delivery. This shows that whilst most responses lay on the (\) diagonal - indicating a broad correlation between change in

technologies and change in the products or services provided and/or the means of production and/or the means of delivery - a substantial minority of the responses lay off the diagonal. A first 'off diagonal' group were the 14% of respondents that indicated significant changes to the technologies used, but at most only minor changes to the services provided and/or the means of production and/or the means of delivery. Amongst this group, the new technologies may have been related to other forms of change, such as organisational or relational change. Another 14% of the respondents constituted the second group of 'off diagonal' responses. These reported significant or complete change to at least one of the following: the services provided, the means of producing services, and the means of delivering services. However, these firms apparently made these changes without changing significantly the technologies used to produce or deliver services.

The second cross-tabulation shows the extent of changes to the technologies used against the greatest extent of change in all of the other seven dimensions of change we have presented above. As before, this shows the majority of firms lay on the diagonal – amongst these there is an apparent connection between the extent of change in the technologies used and in the extent of change in at least one of the other dimensions of change assessed above. Again, however, there are two off-diagonal groups. The first is small, at 7%. Amongst this group the extent of change to technologies was complete or significant, but these businesses also report at most only slight change to any of the other forms of change. It is not clear how the significantly changed technologies have impacted on these businesses. The second group of 'off diagonal' respondents is more substantial, at 21% of the responses. This is the group of respondents which reported complete or significant change to one or more of the other seven dimensions of innovation assessed above whilst claiming at most only a slight change to the technologies used to produce or deliver services. This shows that whilst technologies are very often an integral part of change in services, they are not always necessary for innovation in services. The 'non-technological' dimensions of service innovation deserve fuller attention in the future.

Figure 5.7 Technologies and Other Forms of Change

		CIS types of Change						All Other Types of Change			
		0	1	2	4			0	1	2	4
Tech- nologies	0	8%				Tech- nologies	0	7%			
	1		27%		14%		1		21%		21%
	2			14%			2			7%	39%
	4				4%		4				5%

Notes:

CIS – Types of Innovation Identified by the European Community Innovation Surveys (CIS) – i.e., Product and Process Innovation – including service products and production and delivery processes.

Non-CIS – Types of Innovation NOT identified by the European Community Innovation Surveys (CIS), including changes in skills of workforce, changes in technologies, changes in organisational structure and changes in inter-relations with other businesses and customers.

0 – Unchanged; 1 – Only Slightly Changed; 2 – Changed to a Significant Extent; 4 – Changed Completely

Skills, Technologies and Change

Alongside investing in new technologies, most of the information processing businesses that participated in our survey reported that it was either ‘crucial’ or ‘very important’ (64%) to train or retrain existing staff in the business. A further quarter (24%) regarded such training as of ‘medium importance’. Only 4% declared the training or retraining of existing staff to be ‘not important’, whilst 8% declared this to be of ‘low importance’. Although we did not ask more detailed questions, such as the number of training days per employee, this clearly suggests a dynamic environment with respect to the skills mix necessary for these businesses to complete. The need to train new staff entering into the business was even more widely appreciated. Three quarters (76%) of the respondents claimed this was ‘crucial’ or ‘very important’, whilst a further 17% stated it was of ‘medium importance’. Just 2% thought the training of new staff was ‘not important’ and 5% declared it to be of ‘low importance’.

Figure 5.8 shows the relationship between the extent to which the businesses reported change in the technologies they used to produce or deliver services and the importance they attached to training of existing and new staff. There are two notable aspects of how these distributions inter-relate. Firstly, there appears to be a close connection between the need for training and changes in the technologies used: only 5% of businesses stated that the technologies used had changed significantly or completely but that training of existing staff was of no or low importance. Only 4% made this claim with regard to training new staff. Contrast this with the 35% and 39% of the response which claimed that their technologies had changed significantly or completely and that it was very important or crucial to train existing and new staff. This suggests significant technological change is usually accompanied by a need to change or adapt the skills of the organisation, and that significant technological change is not seamlessly absorbed into the organisation.

Figure 5.8 Change in Technologies Used & Training of Existing & New Staff

		Training Existing Staff						Training New Staff			
		0	1	2	4			0	1	2	4
Tech- nologies	0	2%		12%	28%	Tech- nologies	0	1%		8%	37%
	1		5%				1		3%		
	2			12%	35%		2			8%	39%
	4		5%				4		4%		

Notes:

Technologies = Extent of Change in Technologies Used: 0 – Unchanged; 1 – Only Slightly Changed; 2 – Changed to a Significant Extent; 4 – Changed Completely

Training ... = Importance of Training: 0 – Not Important; 1 – Of Low Importance; 2 – Of Medium Importance; 4 – Crucial / Very Important

However, the second notable finding suggests that changing or upgrading skills is also often necessary even in the absence of technological change. For it is notable that a large proportion of respondents claimed training to be very important or crucial to their business even though they also reported at most only a slight change in the technologies used to produce or deliver services. Nearly 30% of the respondents made this combination of answers with respect to the training of existing staff, whilst nearly two-fifths made the same claims with regard to the training of new staff.

Conclusions

Our analysis of the survey response from the information processing 'sector' respondents highlights similar issues to those discovered in relation to the road transport respondents.

1. Competing in information processing activities appears to require that attention be paid to multiple aspects of the services provided. Like road transport, notable here is the emphasis on service quality. Also similar to road transport is the low grading given to the importance of introducing new services. This, combined with the emphasis on customised as opposed to standardised services, suggests that continuous forms of largely 'hidden innovation' are likely to be more significant than explicit innovation through the introduction of new services. The relatively high grading given to the importance of workforce skills is also significant, as it shows the importance of the human aspects of these services.
2. In terms of the extent of 'change' within the businesses, the greatest extent of change was again found in the technologies used. There was also extensive change reported to the skills of the workforce used to produce or deliver services.
3. Changes in the technologies used tended to be associated with other forms of change, but equally not all forms of change (such as organisational and relation change) was dependent on new technologies.
4. Changes in the technologies used was closely related to changes in the skills required, and thereby to the training and retraining of staff. This suggests that new technologies are not easily absorbed into information processing businesses, and that therefore these businesses should not be regarded as mere passive adopters of technologies. However, considerable training and retraining was also required even in the absence of significant technological change.

5.4 Design and Related Activities

Contextualisation

The vast majority of the design businesses that responded to the survey were independent operations, not owned by another business. They were also mainly established businesses, although about a fifth had been established in the last five years. In terms of size, the design businesses tended to be smaller than the road transport and information processing businesses. One third had only one or two employees (including directors), whilst another third had 3 to 9 employees. Only 1% were large businesses with 250 or more employees. The majority of the businesses sought to grow larger, although most sought moderate rather than substantial growth.

Table 5.6 Design: Ownership, Size, Age and Growth Objectives

Ownership of Business:		Year of Establishment:	
Independent Firm / Sole Trader	94%	Before 1998	82%
Subsidiary*	6%	1998-2000	11%
Not for Profit Organization#	1%	2001-2003	7%
Total	100%	Total	100%
Number of Valid Responses		Number of Valid Responses	
396		396	
Business Size (Total Employment):		Growth Objective (next 5 years):	
1 or 2	32%	Become Smaller	4%
3 to 9	38%	Remain Same Size	22%
10 to 19	12%	Grow Moderately	60%
20 to 49	10%	Grow Substantially	14%
50 to 249	6%		
250+	1%		
Total	100%	Total	100%
Number of Valid Responses		Number of Valid Responses	
395		388	

* Wholly or partially owned by another business; # or Part Thereof

Table 5.7 Design: Markets and Competition

Location of Customers:		Number of Competitors and New Competitors	Number of Competitors	New Competitors#
Mainly local*	12%	None	3%	28%
Mainly regional	27%	One or Two	7%	16%
Mainly national	34%	A Few (3 or 4)	14%	19%
Across the EU/NAFTA	12%	Several (5, 6 ,7)	17%	17%
Spread across the world	15%	Many	59%	20%
Total	100%	Total	100%	100%
Number of Responses		Number of Responses		
396		389		329

* within 50 kilometres or 30 mile radius

which entered the 'area of business' in recent years

The majority of the design businesses served regional or national markets rather than local or international markets. The majority also recognised many competitors, with only 10% stating they had no more than two competitors. Again, there was a wider variation

in the extent to which the businesses recognised new competitors had entered their area of business in recent years.

The Nature of the Services Provided and the Competitive Basis of the Businesses

Almost all of the design businesses that responded to the survey provided customised services (defined as services that are changed for each individual customer), although most also provided some standardised services (defined as services which do not change between individual customers). Less than 1% provided ‘only standardised services’, whilst 44% supplied ‘only customised services’. 7% provided ‘mainly standardised’ services’, whilst 28% supplied ‘mainly customised services’. The remaining 19% provided a mixture of standardised and customised services.

The businesses were asked to grade between ‘of no importance’ and ‘of high importance’ 16 factors that might relate to their ‘success’. As with the two previous sectors, the first thing to note is the high number of factors the firms tended to identify as ‘of high importance’: the median business identified 8 of the 16 factors as being of high importance, and only 6% identified 3 or fewer as of high importance to the success of their business. This suggests that finding a ‘recipe for business success’ is difficult, as it requires attention to many different competitive dimensions, or that the businesses were not really clear what factors truly determined their success.

Figure 5.9 Design Businesses: Factors Important for their Success

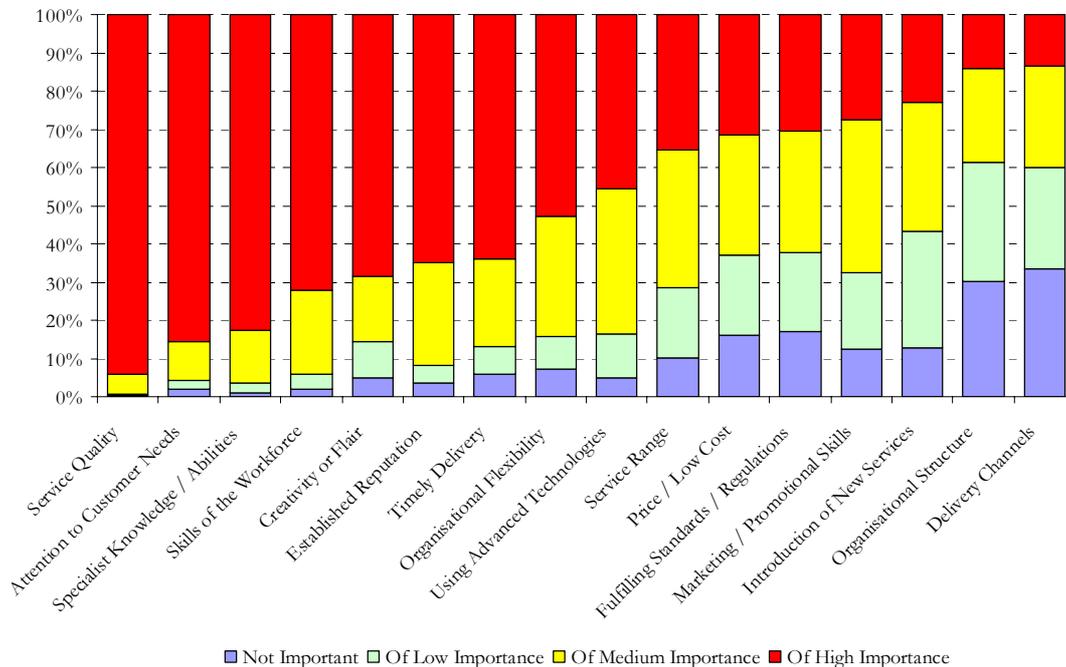


Figure 5.9 ranks the factors by the extent to which the businesses agreed they were ‘of high importance’ to their success. As with road transport and information processing, service quality was the most widely recognised factor of ‘high importance’ to their businesses’ success, followed by paying attention to individual customer needs, with specialist knowledge and abilities third. The skills of the management and workforce

ranked fourth, followed by creativity and flair in the services provided. With the exception of organisational structure and having a variety of delivery channels there was again a reluctance to identify any of these factors as being unimportant. The introduction and use of advanced technologies ranked around the middle of these factors, and was rarely described as 'not important'. The introduction of new services, meanwhile, was yet again amongst the least likely of these factors to be identified as being of 'high importance'.

A factor analysis conducted on these results again found four factors, which differed from those in the two previous sectors. The first factor related strongly to maintaining organisational flexibility and the skills of the management and workforce, whilst the second related strongly to the introduction of new services and providing a full or broad range of services. This perhaps indicates a desire to act as a 'one-stop-shop' for design solutions. The third factor related most strongly to having specialist knowledge or abilities, but also to paying attention to individual customer needs, creativity and flair in the services provided, and to the quality of the services provided. This set of attributes is perhaps that that is most commonly associated with design activities, particularly in small design consultancies. Interestingly, the last factor related to the rapid or timely provision of services, and to competing on price or cost of services. This suggests a 'jobbing designer' dimension, which is not normally highlighted. Again, however, the identification of these four factors suggests variety and several dimensions to business success in design activities. The forms of innovation associated with each dimension are likely to be different, where some are more explicit and others more subtle.

The Extent of Change in Design Businesses

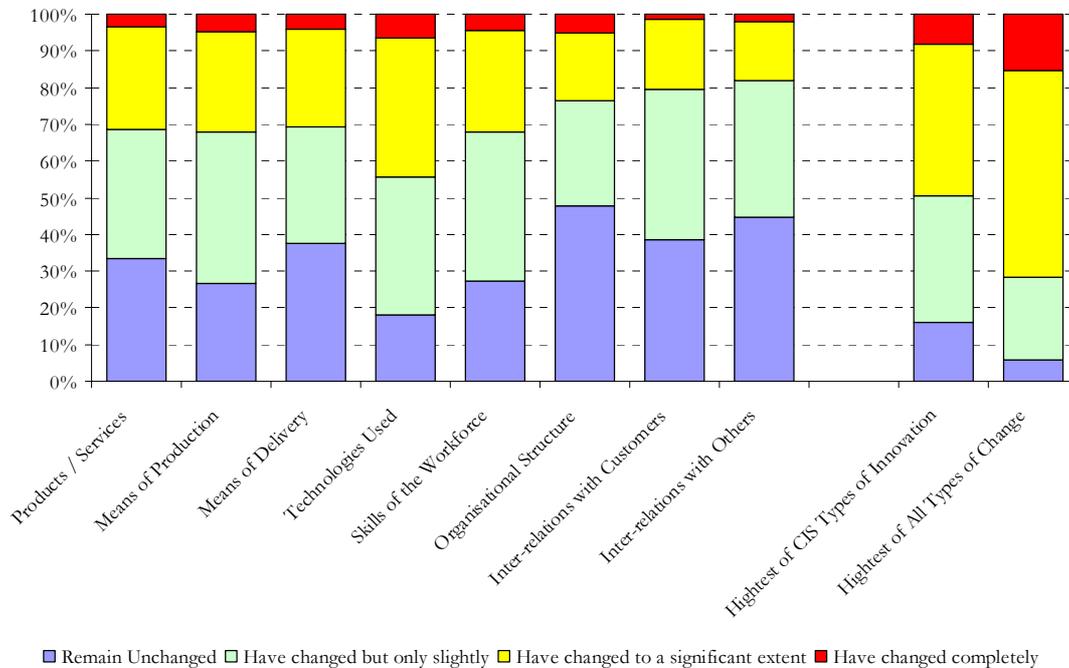
Figure 5.10 shows the extent of change reported in the various dimensions of the design businesses' activities. As with road transport and information processing businesses, the greatest change was reported in the technologies used, with 44% of the respondents reporting significant or complete change. A little over 30% of the businesses reported significant or complete change in each of the following: the services provided; the means of producing services; the means of delivering services; and the skills used to produce or deliver services. Around a quarter reported significant or complete change to their organisational structure, whilst a fifth reported significant or complete change to their inter-relations with customers, and 18% reported significant or complete change to their inter-relations with other businesses.

Looking at the greatest extent of change, about 8% of the businesses reported complete change in at least one of the three CIS-types of innovation: products, processes of production and/or processes service delivery. A further 42% reported significant change in at least one of these dimensions, whilst a third reported (at most) only slight change, and the final 16% reported no change. Because the survey cannot claim to be representative, we should treat these distributions with care. We shall be more interested in the relative rather than the absolute levels of change reported, as well as the relationships between the various answers.

If we take all eight forms of change and select the greatest extent of change reported, we find that 15% of the businesses reported complete change in at least one of these dimensions, whilst over half (56%) reported significant change. A further fifth (23%)

reported (at most) only a slight change to one or more of these dimensions, and the remaining 6% reported no change at all. The greater extent of change reported when examining all the dimensions as opposed to those covered by the CIS indicates the extent of innovation overlooked by the CIS.

Figure 5.10 Design Businesses and the Extent of Change Across Various Dimensions



A factor analysis on the dimensions of change found two factors for the design sector. As with the road transport and information processing sectors, the first factor related to the first five dimensions of change, and the second to the last three. Essentially, these can be seen as technological versus organisational-relational forms of change. Within this context, it is worth emphasising that innovation studies have tended to focus on technological forms of change, whilst organisational and relational forms of change have received little attention.

Technologies and Change

As with road transport and information processing, investing in new technologies is very important to most of the design businesses we surveyed. Over half (53%) of them declared that investing in new technologies was ‘very important or crucial’ to their business, whilst a further third declared such investments were ‘of medium importance’. Just 3% claimed investing in new technologies was ‘not important’, whilst the remaining 9% claimed such investments were of ‘low importance’.

To explore further the significance of technological change to the wider innovation activities of the firm, we again present two cross tabulations (Figure 5.11). The first shows the extent of changes to the technologies used against the greatest extent of change in the service ‘products’ provided, the means of production and the means of delivery. As with road transport and information processing, this shows that whilst

most responses lay on the (\) diagonal - indicating a broad correlation between change in technologies and change in the products or services provided and/or the means of production and/or the means of delivery - a substantial minority of the responses lay off the diagonal. A first 'off diagonal' group was the 12% of respondents that indicated significant changes to the technologies used, but at most only minor changes to the services provided and/or the means of production and/or the means of delivery. Amongst this group, the new technologies may have been related to other forms of change, such as organisational or relational change. Another 18% of the respondents constituted the second group of 'off diagonal' responses. These reported significant or complete change to at least one of the following: the services provided, the means of producing services, and the means of delivering services. However, these businesses apparently made these changes without changing the significantly the technologies used to produce or deliver services.

Figure 5.11 Technologies and Other Forms of Change

		CIS types of Change						All Other Types of Change			
		0	1	2	4			0	1	2	4
Tech- nologies	0	10%		18%		Tech- nologies	0	6%		27%	
	1	28%					1	23%			
	2	12%		28%			2	7%		33%	
	4				4%		4				5%

Notes:

CIS – Types of Innovation Identified by the European Community Innovation Surveys (CIS) – i.e., Product and Process Innovation – including service products and production and delivery processes.

Non-CIS – Types of Innovation NOT identified by the European Community Innovation Surveys (CIS), including changes in skills of workforce, changes in technologies, changes in organisational structure and changes in inter-relations with other businesses and customers.

0 – Unchanged; 1 – Only Slightly Changed; 2 – Changed to a Significant Extent; 4 – Changed Completely

The second cross-tabulation shows the extent of change to the technologies used against the greatest extent of change in all of the other seven dimensions of change we have presented above. As before, this shows the majority of firms lay on the diagonal – amongst these there is an apparent connection between the extent of change in the technologies used and in the extent of change in at least one of the other dimensions of change assessed above. Again, however, there are two off-diagonal groups. The first is small at 7%. Amongst this group the extent of change to technologies was complete or significant, but these businesses report at most only slight change to any of the other forms of change. Quite how the significantly changed technologies have impacted on these businesses remains a mystery. The second group of 'off diagonal' respondents is more substantial, at 27% of the responses. This is the group of respondents who reported complete or significant change to one or more of the other seven dimensions of innovation assessed above whilst claiming at most only a slight change to the technologies used to produce or deliver services. As with the road transport and information processing sectors, this shows that whilst technologies are very often an integral part of change in services, they are not always necessary for innovation in services. Again, these 'non-technological' dimensions of service innovation deserve fuller attention in the future.

Skills, Technologies and Change

Alongside investing in new technologies, almost half of the design businesses that participated in our survey reported that it was either ‘crucial’ or ‘very important’ (46%) to train or retrain existing staff in the business. A further quarter (38%) regarded such training as of ‘medium importance’. Only 9% declared the training or retraining of existing staff to be ‘not important’, whilst 7% declared this to be of ‘low importance’. Although we did not ask more detailed questions, such as the number of training days per employee, this clearly suggests a dynamic environment with respect to the skills mix necessary for these businesses to complete. Given that design is usually a professional activity, the extent to which training and retraining of existing staff is regarded as important is particularly striking. The need to train new staff entering into the business was slightly more widely appreciated. Half of the respondents claimed this was ‘crucial’ or ‘very important’, whilst a further quarter stated it was of ‘medium importance’. 15% thought the training of new staff was ‘not important’ and 10% declared it to be of ‘low importance’.

Figure 5.12 shows the relationship between the extent to which the businesses reported change in the technologies they used to produce or deliver services and the importance they attached to the training of existing and new staff. This again shows that there appears to be a close connection between the need for training and changes in the technologies used: only 5% of businesses stated that the technologies used had changed significantly or completely but that training of existing staff was of no or low importance. Only 9% made this claim with regard to new staff. Contrast this with the 26% and 24% of the response which claimed that their technologies had changed significantly or completely and that it was very important or crucial to train existing and new staff. This again indicates significant technological change is usually accompanied by a need to change or adapt the skills of the organisation.

Figure 5.12 Change in Technologies Used & Training of Existing & New Staff

		Training Existing Staff						Training New Staff			
		0	1	2	4			0	1	2	4
Tech- nologies	0	2%		25%	20%	Tech- nologies	0	4%		14%	26%
	1		9%				1		11%		
	2		5%	13%	26%		2		9%	11%	24%
	4						4				

Notes:

Technologies = Extent of Change in Technologies Used: 0 – Unchanged; 1 – Only Slightly Changed; 2 – Changed to a Significant Extent; 4 – Changed Completely

Training ... = Importance of Training: 0 – Not Important; 1 – Of Low Importance; 2 – Of Medium Importance; 4 – Crucial / Very Important

However, the second notable finding suggests that changing or upgrading skills is also often necessary even in the absence of technological change. For it is notable that a large proportion of respondents claimed training to be very important or crucial to their business even though they also reported at most only a slight change in the technologies used to produce or deliver services. A fifth of the respondents made this combination of answers with respect to the training of existing staff, whilst a quarter made the same claims with regard to the training of new staff.

Conclusions

Our analysis of the survey response from the design businesses highlights similar issues to those discovered in relation to the road transport and information processing respondents.

1. Competing in design activities appears to require that attention be paid to multiple aspects of the services provided. Like road transport and information processing the emphasis on service quality is notable. Also similar to road transport and information processing is the low grading given to the importance of introducing new services. This, combined with the emphasis on customised as opposed to standardised services, suggests that continuous forms of largely 'hidden innovation' are likely to be more significant than explicit innovation through the introduction of new services. The relatively high grading given to the importance of workforce skills is also significant, as it shows the importance of the human aspects of these services.
2. In terms of the extent of 'change' within the businesses, the greatest extent of change was again found in the technologies used. There was also extensive change reported to the skills of the workforce used to produce or deliver services.
3. Changes in the technologies used tended to be associated with other forms of change, but equally not all forms of change (such as organisational and relation change) was dependent on new technologies. This also highlights the importance of non-technological innovation.
4. Changes in the technologies used were closely related to changes in the skills required, and thereby to the training and retraining of staff. This suggests that new technologies are not easily absorbed into design businesses, and that therefore these businesses should not be regarded as mere passive adopters of technologies. However, considerable training and retraining was also required even in the absence of significant technological change.

5.5 Care for the Elderly

Contextualisation

The extension of our survey to care for the activities was one of the most innovative dimensions of this part of the study, because this type of ‘personal service’ has not been covered by other innovation measurement instruments such as the CIS, not least because it was doubted whether the understanding of innovation would apply. We shared these concerns, particularly with regard to the ‘commercial’ language used in the survey, which refers to businesses and competition. Nonetheless, on the basis of nothing ventured nothing gained, we extended our survey on an experimental basis to elderly care services. If anything, we were surprised how smoothly the survey and its concepts have been applied to the elderly care ‘businesses’.

Unlike the other three ‘sectors’, the elderly care ‘sector’ is characterised by a large proportion of non-commercial ‘businesses’. Indeed, more than half of our respondents were from ‘not for profit’ organisations. The great majority of these ‘businesses’ were well established, only 13% having been established in the last five years. They ranged widely in size, with a quarter having less than 20 employees, whilst almost a fifth had 250 or more employees. In terms of growth objectives, four-fifths of the ‘businesses’ sought growth, although the majority of these sought moderate rather than substantial growth.

Table 5.8 Elderly Care Services: Ownership, Size, Age and Growth Objectives

Ownership of Business:		Year of Establishment:	
Independent Firm / Sole Trader	42%	Before 1998	87%
Subsidiary*	4%	1998-2000	7%
Not for Profit Organization#	54%	2001-2003	6%
Total	100%	Total	100%
Number of Valid Responses		Number of Valid Responses	
208		202	
Business Size (Total Employment):		Growth Objective (next 5 years):	
1 or 2	3%	Become Smaller	1%
3 to 9	11%	Remain Same Size	19%
10 to 19	9%	Grow Moderately	59%
20 to 49	33%	Grow Substantially	22%
50 to 249	25%		
250+	19%		
Total	100%	Total	100%
Number of Valid Responses		Number of Valid Responses	
207		199	

* Wholly or partially owned by another business; # or Part Thereof

Perhaps unsurprisingly, the distribution of customers or clients was much more spatially constrained with the care for the elderly ‘businesses’ than with the other sectors. Almost 60% of the businesses stated that their customers were mainly local, and another 28% declared they were mainly regional. Beyond this there were a businesses whose customers were spread across their home country, but very few were internationalised. This is perhaps due to the high degree of cultural embeddedness in elderly care services, but perhaps also points to the significance of national regulatory regimes.

In relation to competition, it is perhaps surprising that over two-fifths of the respondents claimed their business faced many competitors, whilst relatively few declared they had no competitors. As with the other sectors, there was a diversity of views concerning the number of new competitors that had entered the area of business in recent years.

Table 5.9 Elderly Care Services: Markets and Competition

Location of Customers:		Number of Competitors and New Competitors	Number of Competitors	New Competitors#
Mainly local*	59%	None	15%	40%
Mainly regional	28%	One or Two	10%	18%
Mainly national	11%	A Few (3 or 4)	18%	16%
Across the EU/NAFTA	0%	Several (5, 6,7)	13%	10%
Spread across the world	1%	Many	44%	18%
Total	100%	Total	100%	100%
Number of Responses	207	Number of Responses	202	200

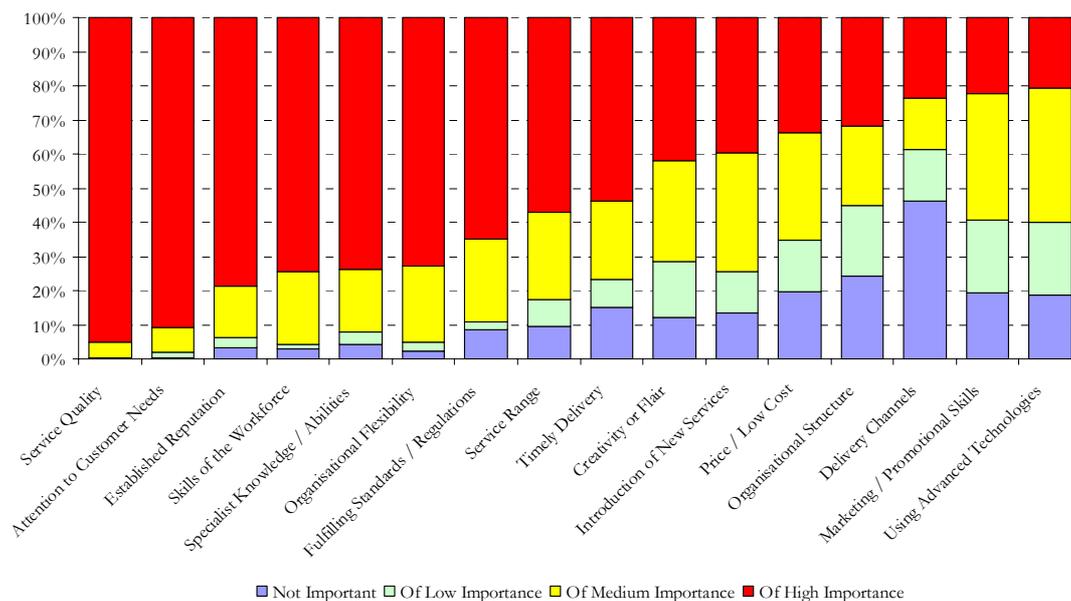
* within 50 kilometres or 30 mile radius

which entered the 'area of business' in recent years

The Nature of the Services Provided and the Competitive Basis of the Businesses

Most of the elderly care businesses that responded to the survey provided a mixture of customised services (defined as services that are changed for each individual customer) and standardised services (defined as services which do not change between individual customers). Less than 2% provided 'only standardised services', whilst 24% provided 'only customised services'. 8% supplied 'mainly standardised' services', whilst 34% provided 'mainly customised services'. The remaining third supplied a mixture of standardised and customised services.

Figure 5.13 Elderly Care Businesses: Factors Important to Success



The 'businesses' were asked to grade between 'of no importance' and 'of high importance' 16 factors that might relate to their 'success'. Yet again, the businesses tended to identify a high number of factors as being 'of high importance': the median business identified 9 of the 16 factors as being of high importance, and only 6% identified 3 or fewer as of high importance to the success of their business. This probably indicates that finding a 'recipe for business success' is difficult, as it requires attention to many different competitive dimensions, although it might indicate that the businesses do not really know what the fundamental reasons for their 'success' are.

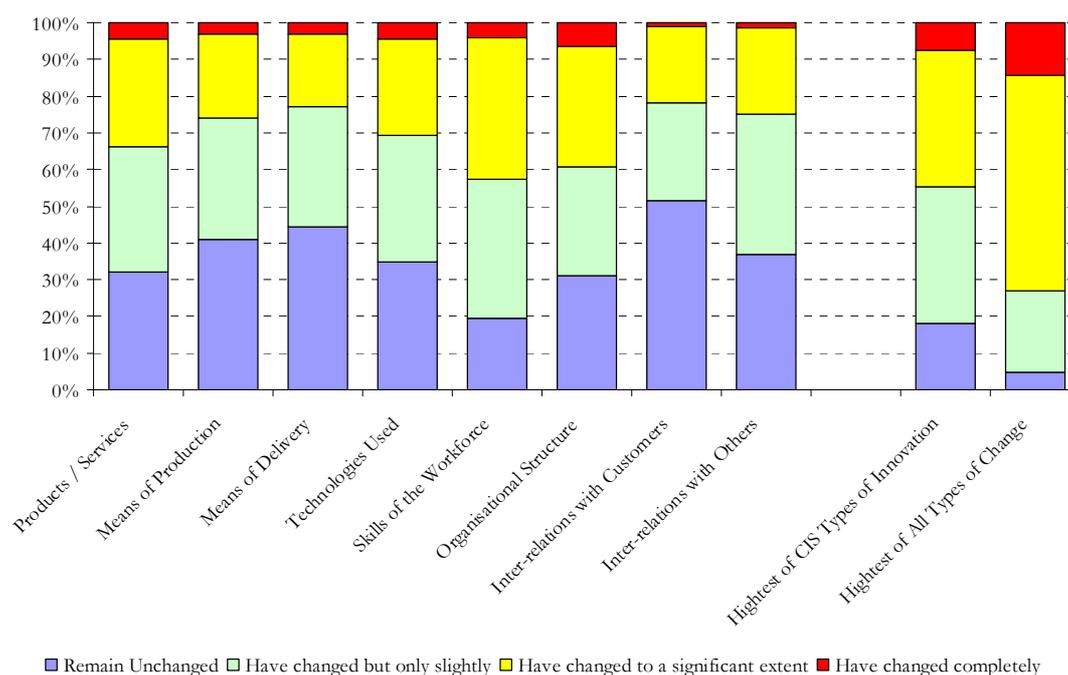
Figure 5.13 ranks the factors by the extent to which the businesses agreed they were 'of high importance' to their success. As with the other sectors, the quality of services was the most widely recognised factor of 'high importance' to the businesses' success. This was followed by paying attention to individual customer needs, with having an established reputation third, and the skills of management and the workforce fourth. With the exception of having a variety of delivery channels there was again a reluctance to identify any of these factors as being unimportant. Interestingly, alongside marketing and promotional skills, the introduction and use advanced technologies ranked as the least likely factor to be described as being of high importance. The introduction of new services was considered to be of high importance by about 40% of the respondents.

A factor analysis conducted on these results found five factors, however one was very poorly defined and was not clearly associated with any one (or more) of the above dimensions of success. Amongst the other factors, one related strongly to having an established reputation, and a second to having specialist skills or abilities. The third related to paying attention to individual customer or client needs and to the quality of the services provided, whilst the fourth related to the introduction of new services and having a variety of delivery channels (as well as, to a lesser extent, having marketing or promotional capabilities, providing a full or broad range of services, creativity and flair in the services provided, and the use of new or advanced technologies). Although this factor analysis is less convincing than those for the other sectors, it again suggests a variety of 'spaces' within which businesses can develop and within which the emphasis on innovation of different forms is likely to vary.

The Extent of Change in Elderly Care Businesses

Figure 5.14 shows the extent of change reported in the various dimensions of the care for the elderly businesses' activities. Unlike the other three sectors, the greatest change was not reported in the technologies used, but in the skills of the workforce, with 43% of the respondents reporting significant or complete change. This was followed by organisational change, which two fifths of the businesses reported having changed completely or significantly. The high level of change in these dimensions suggests a high level of 'soft' innovation in care for the elderly (and similar) activities. Around a third of the businesses reported significant or complete change in the services provided, and 30% reported significant or complete change in the technologies used. A quarter reported significant or complete change to their means of producing services, and to their inter-relations with other businesses, whilst slightly fewer reported change to their means of delivering services, and to their inter-relations with customers or clients

Figure 5.14 Elderly Care Businesses: Change Across Various Dimensions



Looking at the greatest extent of change, about 7% of the businesses reported complete change in at least one of the three CIS-types of innovation: products, processes of production and/or processes service delivery. A further 37% reported significant change in at least one of these dimensions, whilst another 37% reported (at most) only slight change, and the final 18% reported no change. As with all of the sectors we should interpret these distributions with care.

If we take all eight forms of change and select the greatest extent of change reported, we find that 14% of the businesses reported complete change in at least one of these dimensions, whilst over half (59%) reported significant change. A further fifth (2%) reported (at most) only a slight change to one or more of these dimensions, and the remaining 6% reported no change at all. These results again show the importance of forms of change that are not addressed by the Community Innovation Surveys, and indeed it would appear that the extent to which restricting ‘innovation’ to those dimensions considered by the CIS would more significantly under-record the extent of change in elderly care ‘businesses’ than in the other service sectors we have examined.

A factor analysis on these dimensions of change found only one factor for the elderly care sector; unlike the other sectors, the analysis was unable to detect a difference between the technological and organisational-relational forms of change.

Technologies and Change

Overall, investing in new technologies appears to be less important to the care for the elderly businesses than for those in the other three sectors. This said, a third (32%) of the care for the elderly business than participated in our survey declared that investing in new technologies was ‘very important or crucial’ to their business, whilst a further 38% declared such investments were ‘of medium importance’. Just 9% claimed investing in

new technologies was ‘not important’, whilst the remaining 21% claimed such investments were of ‘low importance’.

To explore further the significance of technological change to the wider innovation activities of the businesses, we again present two cross tabulations. The first shows the extent of changes to the technologies used against the greatest extent of change in the service ‘products’ provided, the means of production and the means of delivery. As with the other sectors, this shows that whilst most responses lay on the (\) diagonal indicating a broad correlation between change in technologies and change in the products or services provided and/or the means of production and/or the means of delivery, a substantial minority of the responses lay off the diagonal. A first ‘off diagonal’ group were the 8% of respondents that indicated significant changes to the technologies used, but at most only minor changes to the services provided and/or the means of production and/or the means of delivery. Amongst this group, the new technologies may have been related to other forms of change, such as organisational or relational change. Another 22% of the respondents constituted the second group of ‘off diagonal’ responses. These reported significant or complete change to at least one of the following: the services provided, the means of producing services, and the means of delivering services. However, these firms apparently made these changes without changing the significantly the technologies used to produce or deliver services.

Figure 5.15 Technologies and Other Forms of Change

		CIS types of Change						All Other Types of Change			
		0	1	2	4			0	1	2	4
Tech- nologies	0	3%		22%		Tech- nologies	0	5%		43%	
	1	35%					1	22%			
	2	8%		21%			2	3%		25%	
	4				2%		4				3%

Notes:

CIS – Types of Innovation Identified by the European Community Innovation Surveys (CIS) – i.e., Product and Process Innovation – including service products and production and delivery processes.

Non-CIS – Types of Innovation NOT identified by the European Community Innovation Surveys (CIS), including changes in skills of workforce, changes in technologies, changes in organisational structure and changes in inter-relations with other businesses and customers.

0 – Unchanged; 1 – Only Slightly Changed; 2 – Changed to a Significant Extent; 4 – Changed Completely

The second cross-tabulation shows the extent of changes to the technologies used against the greatest extent of change in all of the other seven dimensions of change we have presented above. As before, this shows the majority of firms lay on the (\) diagonal. Amongst these there is an apparent connection between the extent of change in the technologies used and in the extent of change in at least one of the other dimensions of change assessed above. Again, however, there are two off-diagonal groups. The first very small, at 3%. Amongst these the extent of change to technologies was complete or significant, but these businesses also report that at most only slight change to any of the other forms of change is. The second group of ‘off diagonal’ respondents is more substantial, at 43% of the responses. This is the group of respondents which reported complete or significant change to one or more of the other seven dimensions of innovation assessed above whilst claiming at most only a slight change to the technologies used to produce or deliver services. As with the other

sectors, this shows that whilst technologies are very often an integral part of change in services, they are not always necessary for innovation in services. The ‘non-technological’ dimensions of service innovation deserve fuller attention in the future.

Skills, Technologies and Change

Not surprisingly, the training of existing and new staff seems to be particularly important amongst our ‘care for the elderly’ respondents. Three quarters (77%) of these businesses reported that it was ‘crucial or very important’ to train or retrain existing staff in the business. A further quarter (18%) regarded such training as ‘of medium importance’. Only 1% declared the training or retraining of existing staff to be ‘not important’, whilst 4% declared this to be ‘of low importance’. This again suggests a dynamic environment with respect to the skills mix necessary for these businesses to maintain their operations. The need to train new staff entering into the business was slightly more widely appreciated: 77% of the respondents claimed this was ‘crucial’ or ‘very important’, whilst a further 19% stated it was ‘of medium importance’. Less than 1% thought the training of new staff was ‘not important’ and 3% declared it to be ‘of low importance’.

Figure 5.16 shows the relationship between the extent to which the businesses reported change in the technologies they used to produce or deliver services and the importance they attached to training of existing and new staff. There again appears to be a close connection between the need for training and changes in the technologies used: only 1% of businesses stated that the technologies used had changed significantly or completely but that training of existing staff was of no or low importance. None of the businesses made this claim with regard to new staff. Contrast this with the 25% of the response which claimed that their technologies had changed significantly or completely and which reported that it was very important or crucial to train both existing and new staff. As with the other three sectors, this indicates significant technological change is usually accompanied by a need to change or adapt the skills of the organisation.

However, the second notable finding suggests that changing or upgrading skills is also often necessary even in the absence of technological change. For it is notable that more than half the care for the elderly businesses claimed training of existing and new staff to be very important or crucial to their business even though they also reported at most only a slight change in the technologies used to produce or deliver services.

Figure 5.3 Change in Technologies Used & Training of Existing & New Staff

		Training Existing Staff						Training New Staff			
		0	1	2	4			0	1	2	4
Tech- nologies	0	2%		13%	52%	Tech- nologies	0	1%		13%	52%
	1		3%				1		4%		
	2		1%	6%	25%		2		0%	6%	25%
	4						4				

Notes:

Technologies = Extent of Change in Technologies Used: 0 – Unchanged; 1 – Only Slightly Changed; 2 – Changed to a Significant Extent; 4 – Changed Completely
 Training ... = Importance of Training: 0 – Not Important; 1 – Of Low Importance; 2 – Of Medium Importance; 4 – Crucial / Very Important

Conclusions

Our analysis of the survey response from the elderly care 'businesses' highlights similar issues to those discovered in relation to the three other 'sectors'.

1. Competing in elderly care activities appears to require that attention be paid to multiple aspects of the services provided. As with the other three sectors, the emphasis on service quality is notable. The introduction of new services did not rank particularly high, and interesting also was that the use of advanced technologies ranked lowest amongst the factors important for success. By contrast, the skills of the workforce ranked highly. These findings, combined with the importance of paying attention of individual customer needs and the emphasis on customised as opposed to standardised services, suggests that continuous forms of largely 'hidden innovation' are likely to be more significant than explicit innovation through the introduction of new services.
2. Unlike the other three sectors, in terms of the extent of 'change' within the businesses, the greatest extent of change was not in the technologies used but in the skills of the workforce. This perhaps points to a significant level of 'soft' innovation, which is not technological but procedural and/or organisational.
3. Changes in the technologies used tended to be associated with other forms of change, but equally not all forms of change (such as organisational and relation change) was dependent on new technologies. This again highlights the importance of non-technological innovation, which has been neglected in the past.
4. Changes in the technologies used were closely related to changes in the skills required, and thereby to the training and retraining of staff. This again suggests that new technologies are not easily absorbed into elderly care businesses, and that therefore these businesses should not be regarded as mere passive adopters of technologies. However, considerable training and retraining was also required even in the absence of significant technological change, showing that technological innovation is only one dimension of the wider process of innovation, learning and adaptation in elderly care businesses.

5.6 Conclusions

From our overview of the survey findings in the four sectors, we can derive a number of significant conclusions:

1. A first conclusion is that as a methodology, our survey appears to have been successful. In particular the extension of the survey to care for the elderly businesses is notable, as this type of service has not previously been surveyed using the CIS. We note that an important element to the CIS is the identification of particular, discrete innovations. Our approach did not require this, and instead considered innovation (or change) in looser terms. Such a looser approach may be more appropriate in services, where particular innovations can be more difficult to identify.
2. Also notable here is the extension of innovation (or change) to organisational and relational forms of change. What this shows is that businesses frequently perceive greater change in these dimensions than they do to the service products they provide or the means they use to produce or deliver services. This is an important observations, but what is now required is research which would clarify the forms of organisational and relational change (or innovation) that are being considered. We therefore welcome the work being undertaken by the scholars who are revising the Oslo Manual as this includes an effort to identify and define 'organisational innovations'.
3. With regard to competition, it would appear this tends to be multifaceted and complex. The strong emphasis placed on quality by the respondents from all four sectors raises important questions, not least how is quality defined, and whether one producer's notion of quality would be recognised by another. The importance attached to satisfying individual customer needs is also significant, particularly in conjunction with the provision of customised services. This, coupled with the tendency for the introduction of new services to hold a relatively low rank in importance, suggests that services tend to be developed on a continuous basis, rather than in occasional leaps. This means that individual innovations are hard to identify, which relates back to the point about the CIS being oriented to the identification of discrete innovations.
4. In three of the four sectors, the greatest extent of 'change' was found in the technologies used within the businesses. The exception here was care for the elderly businesses, amongst which greater change was found in the skills of the workforce. It is interesting to note that whilst technologies were often changed significantly, the adoption of new or advanced technologies did not rank amongst the most widely acknowledged determinants of success. This suggests that new technologies tend to be the servant rather than the master of service improvement and innovation.
5. Overall, the extent of change reported when taking all eight dimensions considered by our survey was considerably greater than if innovation (or change) is confined to the three dimensions considered by the Community Innovation Surveys (CIS). This suggests to an under-recording of innovation in services by the CIS, and particularly an under-recording of the organisational and relational

forms of innovation which may be particularly significant in services. There is an interesting inter-relation between these forms of change. Further analysis shows that whilst changes to the services provided, or the means of service production or delivery usually occur alongside changes to the organisational structure of the business or its inter-relations with its customers or other businesses, the reverse is not so common. Consequently, there is considerable organisational-relational change which appears to be independent of change to the services provided, or the means of producing and/or delivering services.

6. Changes in the technologies used tended to be associated with other forms of change, but equally not all forms of change (such as organisational and relation change) was dependent on new technologies. This again highlights the importance of non-technological innovation, which has been neglected in past studies of innovation which have had a 'technological bias'.
7. Changes in the technologies used tended to relate closely to changes in the skills required, and thereby to the training and retraining of staff. This again suggests that new technologies are not easily absorbed into service businesses, and that therefore these businesses should not be regarded as mere passive adopters of technologies. However, considerable training and retraining was also required even in the absence of significant technological change, showing that technological innovation is only one dimension of innovation, learning and adaptation in elderly care businesses.

In the next chapter, we attempt to draw this evidence together, using multivariate statistical techniques, to explore the 'drivers of innovation'.

6. Innovation & Change in Four Service ‘Sectors’ Part 3 - Drivers of Innovation

6.1 Introduction – Towards an Explanation

In this section, we undertake an investigation, using ordered logistic regressions (a multivariate statistical technique), to explore the ‘drivers’ of innovation. In simple terms, we seek to use the various reported characteristics of the businesses (such as their size, age, location, attitude to growth, etc) to examine the extent to which these are related to the extent of change that the businesses reported across the eight dimensions discussed in the previous chapter. Each characteristic can have one of three impacts on the reported extent of change – it may be positively associated with change. For example, larger businesses may be more likely to engage in change. This is represented by a significant positive co-efficient. Alternatively, a characteristic may be negatively related to change. For example, businesses in one country may be less likely to report change than those in another country, particular the reference country. This would be indicated by a significant negative coefficient. The third possibility is that there is no clear statistical relationship between the characteristic and the extent of change reported by the business. In this case the co-efficient may be positive or negative, but it will not be statistically significant.

We emphasise that the following analysis is experimental. The way in which analyses like these are structured can have some bearing on the findings, whilst cross sectional analyses can also raise problems of causation. Moreover, the findings themselves are open to interpretations, not least because change is relative rather than absolute. To use an analogy of cars on the motorway – the businesses that report greater change can be thought of as cars moving faster, however what we do not know is the relative position of the cars. It may be that the businesses (or cars) that are changing more are catching up, or it may be that they are surging ahead. Despite these problems, we consider that a multivariate analysis can provide a valuable contribution, because this type of analysis shows the importance of various factors whilst other factors are held constant. So, for example, it may show customisation is significantly related to innovation (of change) irrespective of the sector in which it occurs.

We present the empirical estimation of the models at the end of the chapter, whilst the chapter itself is largely a commentary on these models, outlining both expected and actual findings. We begin with some background characteristics of the businesses – their age, size, profit / non-profit orientation and ownership. After this we look at the nature of the markets they serve, as well as the extent and nature of competition in their markets, the perceived barriers to innovation, and the growth objectives of the businesses. Finally, we examine the contextual factors, of the sector and country of activity, before drawing some conclusions.

Background Factors: Age, Size, Ownership, and Profit / Non-Profit Orientation

We begin by assessing how some of the background characteristics of the businesses are related to the extent to which they engaged in change. The following ‘background

characteristics' are assessed: age (in particular whether or not the business is recently established), size (measured in terms of employees), ownership (in particular whether it is part of a wider group of businesses or not), and profit / non-profit orientation.

Recently Established Businesses. We expected recently established businesses (those established since 2000) would be less likely to report change than their older counterparts, and, with the exception of 'new services' (for which the sign is positive, but not significant), we find the sign is always negative. For organisational and customer relationship innovation this is insignificant, but for other business relations, production processes, delivery processes and both technologies and skills used, recently established firms were less likely to change. This perhaps reflects a difference between 'fitness' and 'adaptability'. New businesses have to quickly reach a level of 'fitness' – that is an ability to do their core tasks well. They focus on this rather than the ability to change. By contrast, older businesses have greater scope and need for adaptability. They have learned how to undertake their core tasks, but in order to survive they need to be able to change in response to the changing needs of their customers, and in relation to competitive pressures. This pattern also relates to two different forms of innovation. An 'entrepreneurial form' associated with fitness and new business start-ups, and an 'adaptation form' associated with established businesses.

Business Size (measured as the log of employment). We expected larger organisations to report more change than smaller businesses, as the innovation literature consistently finds this relationship. Reassuringly, our analysis finds this relationship to be consistently positive – as businesses become larger, they are more likely to innovate. However, whilst positive, the co-efficient is insignificant for both process and delivery innovation – there is insufficient evidence to show that larger businesses are more likely to change their means of service provision or service delivery. The co-efficient is around 0.1 for service innovation, change to the technologies and skills used and for change to relations with other businesses, and slightly greater than this for change to customer relations. The largest co-efficient is, understandably, associated with organisational innovation, which shows that as businesses grow larger they are more likely to engage in organisational change.

Subsidiaries of Larger Group Businesses. Businesses that are part of a wider group of organisations are compared against independent organisations. We might expect businesses that are part of a wider group to be more innovative than their independent counterparts, because they might be able to draw on resources from elsewhere in their wider group which could assist them with innovation. On the other hand, their position within the group might protect them from engaging with change. In fact we find no significant difference between independents and group businesses in the extent to which they engaged in these various forms of change – some signs are negative, others positive, but none are significant. We should note that this finding does not mean that the absolute performance of group businesses and independents is necessarily the same, only that their relative performance appears to be similar. If group businesses are already ahead (for example in the use of skills or technologies), this evidence suggests they will remain so. We should emphasise, however, that we do not have any direct evidence that group businesses are actually ahead in these regards, although broader evidence suggests this is likely to be the case.

Non-Commercial (or ‘Not for Profit’) Organisations. Here, non-commercial or not-for-profit businesses are compared against commercial (or ‘for profit’ businesses). Although we might expect that not-for-profit organisations engage less with change, perhaps surprisingly the evidence shows that with each type of innovation, non-commercial organisations were more likely to engage in change. In the case of delivery innovation and changes to the technologies, skills, organisational arrangements and customer relations though the difference is not statistically significant. On the other hand, the evidence shows non-commercial organisations were more likely to engage in service innovation, in production process innovation, in customer relationship innovation and in other business relationship innovation. There are at least three possible explanations for these findings. Firstly, there is a genuine difference – non-commercial organisations are more innovative or engage more fully with change than do commercial organisations; second, non-commercial organisations may have enjoyed a period of catch up (adopting practices already in place amongst commercial organisations) at a time when commercial businesses were innovating less; third – there has been some bias in the selection process such that, relative to commercial businesses, there has been a greater bias in favour of more innovative non-commercial organisations amongst our sample. We do not know which of these explanations, or which combination of them, is responsible for the result, so we would warn against interpreting this finding too strongly. We should also note that of the total sample, only about 10% of the organisations are non-commercial, and most of these are active in the elderly care sector. Also notable was that not-for-profit ‘businesses’ are less likely to perceive competitors, so there may be some complex interactions with the competitiveness results discussed below.

Markets, Competition, Barriers and Growth Objectives

Here we assess the nature of the markets served, the extent of the competition the businesses faced, the basis of their competitiveness (as expressed through the factors important to their success), the barriers they perceive limit innovation, and their growth objectives. These are essentially perceptual and behavioural factors, which relate to how the businesses understand their environment and act within it.

In terms of the **markets served**, we can examine the influence of two aspects of the markets served by the businesses on the extent of change reported. The first of these is the spatial scale of the markets served – i.e., whether these are local, regional, national, or international. The second is the extent to which the businesses provided customised services (as opposed to standardised services).

The Spatial Spread of Markets Served. It is reasonable to expect that the wider the geographical markets served the greater will be the need to engage in innovation. This is because the more widely spread business is likely to face a wider range of influences, such as different and higher quality competitors, and customers with different needs and expectations as to service quality. In the analysis, we compared those businesses that served local, regional and international markets against a reference group which was those businesses that served mainly national markets. The analysis shows that, for most of the various types of change being investigated here, the co-efficients proceed in series, from negative for those serving local markets to positive for those serving international markets. Those serving local markets were less likely to change the services they provide,

to change the production or delivery processes they use, or to change their technologies and organisational structures, or to change their customer relations. This suggests that if innovation is to be encouraged, businesses should be encouraged to compete across wider spatial markets, rather than serve local markets.

There may be one area in which those that serve local markets are ahead however, which is in their customer relations. Because of the proximity between the business and its customers, those businesses which serve mainly local markets may already be very strong in their customer relations. However, if this is the case, the evidence of our analysis suggests this advantage is being eroded. Meanwhile those businesses that served mainly regional markets were less likely to engage in service innovation, to change their technologies and to change the nature of their relations with other businesses.

Finally, organisations that mainly served international markets were only significantly more likely than those that served national markets to change the skills used to deliver their services. This perhaps indicates a further need for skills in understanding a diversity of markets in different countries, but it perhaps also suggests difficulties are encountered when attempting to extend service activities beyond the national level.

Customisation and the Degree of Customisation. The second aspect of the market served relates to the effect of engaging in customising services, as opposed to providing standardised services. Here, customised services are defined as those that are changed for each individual customer. These are contrasted against standard services, which are those that do not change between individual customers. We have included two variables in the regression – firstly whether or not the business provided any customized services (i.e., all those that do not provide only standardized services). Secondly, we assess the impact of the degree of customisation. We would expect those organizations that provided customized services to be more likely to engage in change, particularly in services and production processes and technologies, as well as in their relations with customers and other businesses, as compared with those businesses that only provided standardized services. Moreover, we would anticipate a positive relationship between the degree of customisation and the extent of change. That is, the more a business was oriented to the provision of customised services, the more it would engage in change.

If fact the estimated models show that those businesses that provided customised services were indeed more likely to change their services, their production and delivery processes, their technologies, and their relations with customers and other businesses. Indeed, only for organizational change was there no relationship between the provision of customized services and the extent of change. This suggests that customisation is a strategy which has implications well beyond changing the nature of the service provided – it also impacts on the production and delivery processes, as well as on the technologies and skills used, and on the nature of the inter-relationships between the business, its clients, and other businesses.

Concerning the degree of customisation, however, although this has a positive relationship with almost all of the various types of innovation examined here, only for changes to technologies and changes in customer relations were these relationships statistically significant. This suggests that it is the capacity to customise rather than the extent of customisation which matters more. This is perhaps understandable, as customisation is associated with a strategy of adaptability, rather than fitness, and it is

adaptable businesses which tend to report greater innovation. One final note here is that there is a danger of confusing variation, which is inherent in customisation, and innovation, which may not require 'real' innovation.

The Extent of Existing and New Competition. Competition is thought to be an important driver of innovation, but the relationship between innovation and competition remains poorly explored, particularly through business level studies. We examine the impact of competition on change in two ways. Firstly, we examine whether the extent of competition reported by the businesses impacted on their engagement in change. Secondly, we assess whether the factors they considered important to their success (and hence important to their competitiveness), impacted on their engagement in change.

In relation to the extent of innovation, we might expect those businesses that had few competitors would be less likely to engage in change than those with many, but surprisingly the relationship between the number of competitors and the extent of change was not nearly as clear as might have been anticipated. Although businesses with no or few existing and new competitors were less likely to engage in change, normally these differences were not statistically significant – only with organisational change and changes to customer and other business relations was there some stronger evidence of less engagement in change. The evidence amongst those with a modest number of competitors is mixed, in some aspects these were more likely to engage in change, but in others they were less likely to – there is not a strong consistent picture. What this suggests is that beyond a fairly low threshold, the number of competitors does not have an especially important (direct) relationship with innovation – very probably the quality of competition is rather more important than the quantity of competition. Indeed, there are a few hints that a large quantity of competition can have a negative impact on innovation performance.

In relation to **how the businesses were seeking to compete**, we conducted a factor analysis on the questions which asked the organisations the importance of various dimensions to their success. This found four factors. The first factor related closely to service development and the development of new services. The second factor related to having specialist knowledge, focusing on quality, creativity and customer needs. The third factor related to the organisational aspects of the organisation, including flexibility and workforce skills. The fourth factor related to competing on price and efficiency, particularly in terms of service delivery (Table 6.1).

Unsurprisingly, those businesses that emphasised the first factor were more likely to engage in change, but not just changes to the services they provided – all the forms of innovation considered here. Those organisations that emphasised the second (specialisation) factor were more likely to change their skills and to change their customer relations. It is possible that these organisations actually under-record the extent of their innovative activities, as they are likely to be project based. Those businesses that emphasised the third (organisational) factor were more likely to engage in organisational change, and to enhance the skills of their workforce. Finally, those that emphasised the fourth (price and delivery) factor were less likely to change their customer relations, and relations with other businesses, and their organisational structures. These were also less likely to change their production processes significantly. It is possible that, whereas the businesses that scored highly on the other factors were emphasising adaptability, the

businesses that scored highly on this factor emphasised fitness and an ability to efficiently undertake in existing activities, rather than the ability to undertake new activities.

Table 6.1 Factor Analysis on Factors Important to the Businesses' Success

	1 st Factor	2 nd Factor	3 rd Factor	4 th Factor
Paying attention to individual customer or client needs	0.091	0.380	0.242	0.107
The quality of the services provided	0.029	0.398	0.175	0.102
Having specialist knowledge or abilities	0.249	0.592	0.068	-0.051
Creativity or flair in the services provided	0.486	0.452	-0.024	-0.108
The introduction of new services	0.633	0.152	0.173	0.055
Providing a full or broad range of services	0.527	0.168	0.229	0.241
Having marketing or promotional skills	0.412	0.075	0.257	0.114
Having a variety of delivery channels	0.381	-0.022	0.202	0.440
Competing on price / producing low cost services	0.022	-0.036	0.096	0.391
The rapid or timely delivery of services	0.119	0.220	0.108	0.679
Organizational flexibility / our ability to adapt	0.221	0.175	0.529	0.168
Skills of the Workforce/Management	0.106	0.375	0.526	0.043
The organizational structure of the business	0.228	0.067	0.392	0.229
Having an established reputation	0.184	0.087	0.272	0.122
Using advanced or recently introduced technologies	0.322	0.200	0.232	0.137

This analysis suggests that the mode by which the businesses were seeking to compete is more significant than the extent of the competition they faced. Competition has quantitative and qualitative dimensions, and it would appear that the qualitative dimension has the greater significance in influencing the patterns of businesses innovation behaviour.

We also undertook a factor analysis on **the barriers the businesses perceived reduced their ability to innovate** (These are explored more fully in Chapter 7). This found three factors:

1. The first related to the organisation and its activities – being too busy, lacking skills, or technologies, and having organisational rigidities.
2. The second factor related to the costs of innovation and customers being unresponsive to new services.
3. The third factor related to previous innovation, which is taken to make further change unnecessary.

Of these, we might expect that those businesses that emphasised the first factor would be more likely to engage with change than those which emphasised the other two, for at least those that emphasised the first factor appear to have considered innovation and to have been restricted in the extent of innovation, rather than dismissing the need for change at the outset. Indeed, these expectations are partially fulfilled, as the analysis shows that those that emphasise the first factor tend to be marginally more likely to engage in all of the forms of change considered here. Those that emphasised the second factor were more likely to engage in production and delivery process innovation, as well as changing their relations with customers and other businesses. Finally, those that emphasised the third factor appear more likely to focus on changing their relations with

customers and other businesses. An interesting aspect of these results is that – where there are significant differences - it is those that score highly on these factors that are more, not less, likely to innovate. This perhaps suggests that at the businesses that score highly on these factors tend to be those with a positive attitude to innovation, even though they are confronted by barriers to innovation. It may also reflect the fact that once a business has successfully undertaken an innovation, or set of innovations, it becomes more confident about its ability to implement and gain benefits from innovation. This, in turn, relates to the importance of learning in the whole innovation process.

Table 6.2 Factor Analysis on the Barriers to Innovation

	1 st Factor	2 nd Factor	3 rd Factor
We are too busy / we just don't have the time	0.413	0.135	0.188
It is difficult to innovate with our organizational structure	0.612	0.087	0.103
We lack key staff necessary to effect change	0.727	0.118	-0.008
We lack the technology to effect the desired change	0.499	0.254	0.089
Regulations make innovation too difficult or too costly	0.363	0.304	0.011
The costs or risks of innovation are too high	0.256	0.480	0.061
Customers are unresponsive to new services	0.087	0.703	0.163
Customers are unwilling or unable to pay for new services	0.112	0.694	0.038
Previous change and/or market conditions don't require that we innovate, so we don't	0.173	0.155	0.972
Innovations are too easily copied or imitated	0.202	0.244	0.025

Growth Objectives. We now assess how the businesses' growth objectives related to the extent of change they reported. It might be expected that the more businesses want to grow, the greater will be their need for change. In the analysis, we compared those businesses that indicated a desire to become smaller, to grow moderately, and to grow substantially against the reference group which was the businesses that aimed to remain the same size.

Become Smaller. We might expect those organisations that aimed to become smaller to be less likely to engage in change than those that aimed to remain the same size, and indeed for all the various types of change, except changing relations with customers, the sign on the co-efficient is negative. However, only for changing the way in which services are delivered was this difference statistically significant – thus only for 'delivery innovation' was there strong evidence that those businesses that sought to contract in size were less likely to engage in change than those that aimed to remain the same size. This suggests that businesses that wish to contract in size cannot afford to relax their innovation efforts substantially, or they may go out of business entirely.

Seeking Moderate or Substantial Growth. We might expect that businesses seeking growth would be more likely to engage in change and innovation activities than those that sought to remain the same size. Moreover we might expect that those that sought substantial growth would engage in a greater degree of innovation than those that sought 'only' modest growth. Broadly speaking, these expectations are confirmed. Those seeking modest growth were more likely than those seeking to remain the same size to change their production processes, to change their technologies and skills, and to change

their relations with customers and with other businesses. Meanwhile, those seeking substantial growth were more likely to engage in all the types of innovation except delivery innovation. It is notable that for each type of change, the co-efficient for the businesses seeking substantial growth was (in line with expectations) greater than that for those seeking modest growth. Clearly and as expected, there is a positive relationship between organisations seeking growth in the future and engaging in innovation in the present. This has an important if obvious policy implication. If innovation and change are to be valued, then businesses should be encouraged to seek growth. This search for growth will stimulate engagement in innovative activities – and competition for growth should further stimulate engagement in innovative activities.

Contextual Factors – The Sector and Country of Activities

We now turn to two contextual issues which are the sector and country of activities. In relation to the sectors, we compare the extent of change reported by the information processing, design and elderly care businesses against the road transport businesses, which act as the reference group for this analysis.

Information processing. The co-efficients are, with the exception of customer relations, positive, showing that, other things being equal, information processing organisations are more likely to engage in change than road transport organisations. This is perhaps unsurprising, although for four types of innovation – service innovation, organisational innovation, customer relationships and other business relationships the difference is not statistically significant. Compared with road transport organisations, information processing organisations were more likely to have engaged in innovation in production and delivery processes, and in the technologies and skills they use. Although these differences may have been due to differences in the quality of the respondents to the two sectors, it seems more likely that it reflects a real difference in the pace of change between these two sectors.

Design. As with information processing, the co-efficients are all positive with the exception of change in customer relationships, which has an insignificant negative co-efficient. Organisational change, and change to other business relations are also insignificantly different from road transport, but design businesses are more likely to engage in change with respect to their services, their production and delivery processes and to change the technologies and skills they use. Again, this difference may be due to a difference in the quality of the respondents, but it seems likely that this too reflects a genuine difference in the pace of change in these two sectors.

Elderly Care. Finally, compared with road transport businesses, the elderly care businesses were significantly less likely to engage in changes to their production processes, changes in the technologies they use, or changes in their customer relations. They were no more likely to change the services they provide, to change the means of delivering services, to change the skills they use, or to change their relationships with organisations other than their customers. Although this suggests elderly care activities have engaged in less change, it does not necessarily follow that elderly care businesses are inferior in these dimensions. It may be that elderly care businesses have already adopted some practices which other branches of services are just beginning to adopt. This said, it is likely that elderly care businesses face some particularly severe constraints in terms of

the nature of the changes that they may implement given the significance of regulatory and cultural factors in this type of activity.

Finally, we turn to the comparison of the **extent of change in the various countries**. Here, we compare against Germany as the reference group, the extent of change in France, Italy, Spain, the UK, a collection of smaller EU countries, and the US / Canada. In what follows, we will discuss only those differences that are found to be statistically significant.

France. Relative to German businesses, French businesses are found to be significantly more likely to have engaged in organisational innovation and to have made changes to their customer relations.

Italy. Relative to German businesses, Italian businesses are found to have engaged in significantly more service and production process innovation, as well as organisational change and change in their customer relations. However, they are less likely to have changed the nature of their relations with other businesses.

Spain. Relative to German businesses, Spanish businesses are found to have engaged in significantly more delivery innovation, and to have introduced greater change to their technologies and skills. They have also introduced more change to their customer relations and their relations with other businesses.

UK. Relative to German businesses, UK businesses are more likely to claim they engaged in delivery innovation, and to have engaged in greater change in their customer relations.

Smaller EU countries. Relative to German businesses, those in the smaller EU countries are more likely to have engaged in service, delivery and organisational innovation.

US. Relative to German businesses, US businesses are found to be significantly less likely to have engaged in service innovation, production process innovation, delivery process innovation, skills change and change in their relations with other businesses.

There are several possible interpretations of these differences between the businesses in the various countries included in the study. A first possibility is language differences – it may be that ‘change’ is understood more narrowly in some countries, such as Germany, than in others. This alone would not explain any difference between the UK and the US, although perhaps the heavy emphasis that policy makers have placed on innovation in the UK and Europe has encouraged organisations to ‘see’ greater innovation than is the case in the US. A second possibility is that selection differences (or response differences) has given rise to a different ‘quality’ of response’ in different countries. This was a voluntary survey, and it may be that a wider range of businesses with respect to innovation (or change) performance in the US and Germany agreed to participate in the survey than was the case in most of the other countries. Consequently, there is a less of a bias towards more innovative organisations in the response from the US and Germany than elsewhere.

Aside from these methodological explanations, it is possible that these responses are 'real', rather than a feature of the methodology. One possibility is that there is a difference in the strategies of firms, particularly between the US and Europe. Because the costs of establishing a business tend to be less in the US, it is possible that US firms tend to emphasise fitness rather than adaptability. As mentioned earlier, 'fit organisations' concentrate on doing an established set of activities and improving their performance at those activities. The pattern of improvement tends to be cumulative, and individual advances (changes, or innovations) may not be recognised. By contrast, 'adaptable organisations' are those that retain a greater ability to change into a different set of activities – such change tends to be more discontinuous, and therefore more recognisable than continuous improvements.

A fourth explanation is catch-up. One reason why businesses in European countries other than Germany may be engaging in greater innovation efforts than German businesses, and why US businesses may be engaged in less innovation than German businesses, is that (to a greater or lesser extent) the rest of Europe is engaged in catch-up with Germany, whilst Europe as a whole (including Germany) is engaged in catch-up with the United States. In other words, European firms are currently introducing changes which have *already* been introduced in the United States. We outline these explanations to emphasise the point that displaying less innovation is not necessarily a sign of weakness – ironically, it may even be a sign of (past) strength. We would urge caution however, in the interpretation of these results – the differences may be due to differences in methodology rather than any 'real' differences between businesses in the US, Germany and other countries in Europe.

6.2 Conclusions

This chapter has presented an experimental multivariate analysis which has attempted to investigate the drivers of change amongst the businesses that responded to the survey. Before concluding, we highlight two important points. Firstly, the models are not particularly strong – a great deal of the variation in the reported behaviour of the businesses is not explained by the factors we have examined. This means that a considerable proportion of the behaviours is due to idiosyncratic, rather than systematic, factors and/or that there are important explanatory factors that we have not been able to include in our analysis. With these caveats in mind, we turn to the main findings.

With regard to age, size, ownership and profit motivation, the analysis found that larger and older businesses were in general more likely to engage in change than were smaller, newer businesses. This is, reassuringly, essentially in line with the existing innovation studies literature. It might suggest two forms of innovation: an 'adaptation mode of innovation' which is particularly prevalent amongst larger, established businesses – whereby they change to maintain or enhance their activities and response to customer needs; and a 'fitness mode of innovation', which is particularly associated with new (and small firms). With the fitness mode, the key is doing the core activities efficiently: if the business fails in this it will not survive. Over time, businesses may gradually switch from a fitness to an adaptability mode of innovation. What is notable is that the fitness mode, which is expressed through entrepreneurial start-ups (and to an extent through business failures) has received little attention from analysts of innovation, whereas instruments such as the CIS are essentially orientated to understanding the extent of adaptation

behaviour. Perhaps surprisingly, we did not find evidence that businesses that were part of a larger group were more likely to engage in change, whilst there was some surprising evidence that non-commercial organisations were more likely to engage in change. This might indicate that non-commercial organisations are catching up by adopting practices already in place amongst commercial businesses.

With regard to competition and the orientation of the businesses, we found that the extent of competition had relatively little significance for the extent to which the businesses engaged in change. This suggests the quantity of competition is not especially important. More important is the *quality* of competition and how the business chooses to respond to competitive pressures. With respect to the quality of competition, we found that those businesses that engaged in wider spatial markets were more likely to engage in change, probably because they encounter a higher quality of competition and a greater variety of customer needs. The provision of customised services was also an important driver of change, but not only in the services provided and the technologies used. Customisation as a strategy impacted on the extent of change across all but one of the forms of change investigated here. The extent of customisation did not have such a significant impact.

How the business was seeking to compete also impacted on its engagement with change. Those businesses that sought to compete through the introduction of new services, and through the provision of a broad or full range of services, were particularly marked in their greater engagement with change. Also notable here is how the growth objectives of the businesses related to their engagement in change. Quite simply those that sought to grow were more likely to engage with change than those that did not have ambitions to grow. From a policy perspective, if change is desirable, then means should be found of encouraging businesses to be aggressive with respect to growth, which suggests growth should be rewarded not penalised.

Finally, in relation to the sectors and countries, there was some evidence that the information processing and design businesses were more likely to engage in change than were the road transport businesses, whilst the elderly care businesses were less likely to engage in change. Meanwhile, the evidence suggests the US (and Canadian) businesses were less likely to engage in change than were German businesses, whilst businesses in other European countries tended to be more likely to engage in change than were the German businesses. The interpretation of these differences is problematic, but there are a number of possibilities. The first is that the differences are a product of the methodology. Because the survey was voluntary, the quality of the average respondent might be different across the different countries, such that in some countries the sample is more biased to innovative organisations than others. A second issue is language differences. Because the questionnaire was translated, the concepts might not be understood in exactly the same way in the various countries.

These methodological possibilities aside, it is possible that these differences are (to some extent) 'real'. If that is the case, there are two possible explanations. The first is that a process of 'catch-up' is underway, such that German businesses are tending to catch up with practices already introduced in the US (and Canada), whilst the rest of Europe is engaged in catch-up with Germany. Given the economic problems faced by Germany in recent years, and the emergence of the single European market, this is a possible explanation. A second possible explanation is a difference in orientation between those

countries which tend to emphasise 'fitness' versus those that emphasise 'adaptability'. In the US (and Canada) there is a strong entrepreneurial spirit, with a high volume of business start-ups and failures. It may be that, relative to Europe, the US tends to express its innovation through the fitness model (and business start-up and failure) rather than through the adaptation model which is more prevalent in Europe. We stress that this is only an interpretation, which - at most - is likely to be only a partial explanation for the differences found by our survey. Further research into this dimension would be interesting.

Table 6.3a Ordinal Logistic Regressions on the ‘Drivers of Innovation’

	Services	Prod- uction	Delivery	Techno- logies
Business Established Since 2000 (d)	0.28	-0.41⁺	-0.60⁺⁺	-0.79⁺⁺⁺
Ln(Employment of Business)	0.08⁺⁺	0.05	0.03	0.10⁺⁺
Subsidiary of a Business Group (d)	0.06	0.08	0.16	0.18
Not for Profit Business (d)	0.52⁺	0.82⁺⁺⁺	0.34	0.34
Customers are mainly Local (d)	-0.33[*]	-0.39⁺	-0.64⁺⁺⁺	-0.30[*]
Customers are mainly Regional (d)	-0.28⁺	-0.15	-0.04	-0.24[*]
Customers are International (d)	0.15	0.06	0.15	0.08
Provides Customised Services (d)	1.14⁺⁺	1.14⁺⁺	1.45⁺⁺⁺	1.03⁺⁺
Extent of Customisation (see A below)	-0.01	0.12	0.26	0.56⁺⁺
Competition: No Existing & No New	-0.11	-0.42	-0.19	-0.05
Competition: 1 or 2 Existing, Non New	-0.42	-0.15	0.30	-0.34
Competition: 1 or 2 Existing, 1 or 2 New	-0.08	-0.23	-0.14	0.09
Competition: 3 to 7 Existing; No New	0.20	0.36[*]	0.11	0.19
Competition: 3 to 7 Existing; 1 to 4 New	0.27[*]	0.16	0.16	0.14
Competition 3 to 7 Existing; Many New	0.37	-0.04	-0.04	-0.29
Competition: Many Existing; No New	-0.24	0.25	0.38[*]	0.65⁺⁺
Competition: Many Existing; 1 to 4 New	0.16	0.18	0.03	-0.23
Competition: Many Existing; 5+ New	0.12	0.33[*]	0.61⁺⁺⁺	0.23
1 st Success Factor Score	0.38⁺⁺⁺	0.44⁺⁺⁺	0.48⁺⁺⁺	0.39⁺⁺⁺
2 nd Success Factor Score	-0.02	0.00	0.01	0.08
3 rd Success Factor Score	0.08	-0.03	-0.11	-0.05
4 th Success Factor Score	-0.07	-0.14[*]	-0.06	0.12[*]
1 st Barriers Factor Score	0.10[*]	0.09	0.11⁺	0.06
2 nd Barriers Factor Score	0.13⁺	0.25⁺⁺⁺	0.21⁺⁺⁺	0.02
3 rd Barriers Factor Score	0.04	-0.06	-0.01	-0.03
Objective: Become Smaller (d)	-0.47	-0.07	-0.77⁺⁺	-0.16
Objective: Modest Growth (d)	0.10	0.38⁺⁺	-0.04	0.23[*]
Objective: Substantial Growth (d)	0.51⁺⁺	0.59⁺⁺⁺	0.13	0.50⁺⁺
Sector - Information Processing (d)	0.11	0.42⁺⁺	0.42⁺⁺	0.68⁺⁺⁺
Sector – Design (d)	0.35⁺	0.69⁺⁺⁺	0.55⁺⁺⁺	0.65⁺⁺⁺
Sector - Elderly Care (d)	-0.24	-0.49⁺	0.08	-0.70⁺⁺
Country - France (d)	0.23	0.06	0.19	-0.01
Country – Italy (d)	0.64⁺⁺	0.55⁺⁺	0.14	0.19
Country - Spain (d)	0.27	-0.03	1.35⁺⁺⁺	0.53⁺⁺
Country – UK (d)	0.20	-0.10	0.55⁺⁺	-0.02
Country – Other EU (d)	0.32[*]	-0.06	0.53⁺⁺	-0.15
Country – US / Canada (d)	-0.47⁺⁺	-0.85⁺⁺⁺	-0.42⁺⁺	-0.24
Number of Valid Observations	1074	1073	1072	1072
Final: -2LL	2468.1	2396.9	2320.5	2424.3
Model	159.2	198.0	208.1	186.6
d.f. (Sig.)	37 (0.00)	37 (0.00)	37 (0.00)	37 (0.00)
McFadden R ²	0.061	0.076	0.082	0.071

+++ significant at 1%; ++ significant at 5%; + significant at 10%; * significant at 20%

(A) Businesses that declared they only provide customized services are coded 1; those that provided mainly customized services are coded 0.75; those that provide a mixture of customized and standardized services are coded 0.5; those that provide mainly standardized services are coded 0.25; and those that provide only standardized services are coded 0

Table 6.3b Ordinal Logistic Regressions on the ‘Drivers of Innovation’

	Skills Used	Organiz- ational	Customer Relations	Other Bus. Rel's
Business Established Since 2000 (d)	-0.64+++	-0.03	-0.28	-0.30*
Ln(Employment of Business)	0.10++	0.26+++	0.13+++	0.08+
Subsidiary of a Business Group (d)	-0.07	-0.02	-0.12	-0.04
Not for Profit Business (d)	0.25	0.19	0.59++	0.81+++
Customers are mainly Local (d)	0.01	-0.32*	-0.58+++	-0.21
Customers are mainly Regional (d)	-0.07	-0.13	-0.20	-0.29+
Customers are International (d)	0.31+	-0.07	0.07	0.14
Provides Customised Services (d)	0.77*	0.16	1.35++	1.18++
Extent of Customisation (see A below)	0.18	0.01	0.35*	0.09
Competition: No Existing & No New	0.07	0.45*	-0.76++	-0.60*
Competition: 1 or 2 Existing, Non New	-0.01	-0.78++	-0.36	-0.76++
Competition: 1 or 2 Existing, 1 or 2 New	-0.17	-0.33	-1.35+++	-0.70*
Competition: 3 to 7 Existing; No New	0.42+	0.15	-0.50++	-0.46+
Competition: 3 to 7 Existing; 1 to 4 New	0.17	0.33+	0.17	-0.11
Competition 3 to 7 Existing; Many New	0.28	0.24	0.47*	0.28
Competition: Many Existing; No New	0.14	-0.14	0.64++	0.18
Competition: Many Existing; 1 to 4 New	0.01	-0.10	-0.02	-0.20
Competition: Many Existing; 5+ New	0.40+	0.16	0.03	-0.24
1 st Success Factor Score	0.38+++	0.22+++	0.22+++	0.23+++
2 nd Success Factor Score	0.18++	-0.01	0.18+	-0.05
3 rd Success Factor Score	0.21++	0.31+++	-0.07	0.08
4 th Success Factor Score	-0.04	-0.16+	-0.25+++	-0.24++
1 st Barriers Factor Score	0.13+	0.09	0.10*	0.13+
2 nd Barriers Factor Score	0.08	0.14+	0.21+++	0.19++
3 rd Barriers Factor Score	-0.03	0.07	0.17+++	0.17+++
Objective: Become Smaller (d)	-0.10	-0.44	0.06	-0.40
Objective: Modest Growth (d)	0.43++	0.19	0.39++	0.32+
Objective: Substantial Growth (d)	0.50++	0.52++	0.79+++	0.85+++
Sector - Information Processing (d)	0.31+	0.07	-0.09	0.13
Sector – Design (d)	0.63+++	0.19	-0.17	0.01
Sector - Elderly Care (d)	0.31	0.10	-0.93+++	0.02
Country - France (d)	0.13	0.48++	0.38+	-0.10
Country – Italy (d)	0.27	0.46+	0.43+	-0.59++
Country - Spain (d)	0.47+	-0.03	0.35*	0.41*
Country – UK (d)	0.13	0.26	0.36*	-0.20
Country – Other EU (d)	-0.03	0.97+++	0.08	0.13
Country – US / Canada (d)	-0.78+++	-0.80+++	-0.23	-0.54+++
Number of Valid Observations	1072	1075	1072	1073
Final: -2LL	2355.8	2402.3	2253.6	2211.3
Model	195.6	258.7	194.2	158.0
d.f. (Sig.)	37 (0.00)	37 (0.00)	37 (0.00)	37 (0.00)
McFadden R ²	0.077	0.097	0.079	0.067

+++ significant at 1%; ++ significant at 5%; + significant at 10%; * significant at 20%

(A) Businesses that declared they only provide customized services are coded 1; those that provided mainly customized services are coded 0.75; those that provide a mixture of customized and standardized services are coded 0.5; those that provide mainly standardized services are coded 0.25; and those that provide only standardized services are coded 0

7. Barriers to Innovation

7.1 Introduction

In this, the final analytical chapter of the report, we assess the barriers to innovation faced by service businesses. We draw on evidence from the three data-sets we have previously explored in this report: the Innobarometer, the Second European Community Innovation Survey, and the ‘Four Sectors’ Survey carried out for this project.

7.2 Barriers to Innovation: Evidence from the Innobarometer

The ‘Innobarometer’ asked the firms about the barriers or impediments they faced in undertaking innovation activities. In particular the firms were asked to identify the two most important of the following impediments to innovation activities: 1 – ‘finding or mobilising human resources’; 2 – ‘accessing innovative customers and/or markets’; 3 – ‘finding or using new technologies’; 4 – ‘finding or mobilising financial resources’; 5 – ‘knowledge sharing or networking’; or 6 – ‘protecting the companies knowledge’. As in Chapter 2, we assess the extent to which these were significant in services, and compare the responses from service firms with those from manufacturers.

Of these, accessing innovative customers or markets, and accessing or mobilising human resources were the two most widely cited factors, both being identified by around a third of both manufacturing and service firms (Table 7.1). Access to financial resources was identified as a barrier to innovation by about a quarter of manufacturing and service firms, whilst access to new technologies was identified by a quarter of manufacturing firms but by around a fifth of the service firms. This was the only factor which was identified by significantly different proportions of firms across the two sectors. Knowledge sharing and networking were identified as a barrier by between a fifth and a quarter of the companies, whilst protecting the companies own knowledge was a barrier to innovation for about one in eight companies.

Table 7.1 Barriers to Innovation in Manufacturing and Services

	Manufacturing	Services	Significant Difference?
Accessing innovative customers / markets	33%	33%	✗
Accessing / mobilizing human resources	32%	35%	✗
Accessing / mobilizing financial resources	27%	25%	✗
Finding or using new technologies	26%	18%	✓ (at 1%)
Knowledge sharing or networking	20%	22%	✗
Protecting company’s knowledge	12%	13%	✗

In conjunction with the finding outlined earlier (in Chapter 2) that staff qualifications and professionalism are amongst the most widely regarded strengths of companies with respect to innovation (especially in service activities), the finding that accessing and mobilising human resources is one of the most widely identified barriers to innovation,

highlights the significance of ‘human capital’ in service activities and innovation in services both on the positive and negative side. We therefore further examine further the firms’ views with respect training and to where in the spectrum of educational achievement, there are particular problems, especially with respect to making the firm more innovative.

Between a fifth and a quarter of the respondents claimed that basic skills were a problem, and this proportion did not vary significantly between the manufacturers or service firms. Nor did it vary substantially between those firms that had identified ‘accessing and mobilising human resources’ as one of their two major barriers to innovation and those that had not. Apprenticeships and training of technical and/or commercial staff was much more widely regarded as a problem: half or more of the manufacturing and service firms identified this as a problem. Finally, about 15% of both manufacturers and service firms were dissatisfied with the quality of university graduates. On the other hand, around a third both manufacturing and service firms reported no dissatisfaction with the educational level of their staff. Meanwhile, almost 60% of manufacturers and more than two thirds of the service firms reported difficulties with the motivation of their staff (with respect to innovation).

Table 7.2 Skills and Training as Barriers by Sector

	Manufacturing	Services	Significant Difference?
Basic Skills (Primary Education)	23% [22%]	20% [22%]	✘ [✘]
Apprenticeships and Training of Technical &/or Commercial Staff	56% [64%]	50% [49%]	✓ (1%) [✓(1%)]
Apprenticeships for Technical Staff	45% [55%]	36% [38%]	✓ (1%) [✓(1%)]
Apprenticeships for Commercial Staff	23% [24%]	27% [24%]	✓ (1%) [✓(1%)]
University Graduates	15% [19%]	15% [15%]	✓ (1%) [✓(2%)]
NONE OF THESE	29% [21%]	37% [38%]	✓ (1%) [✓(1%)]
Motivation level of All Staff	59% [58%]	68% [71%]	✓ (1%) [✓(1%)]

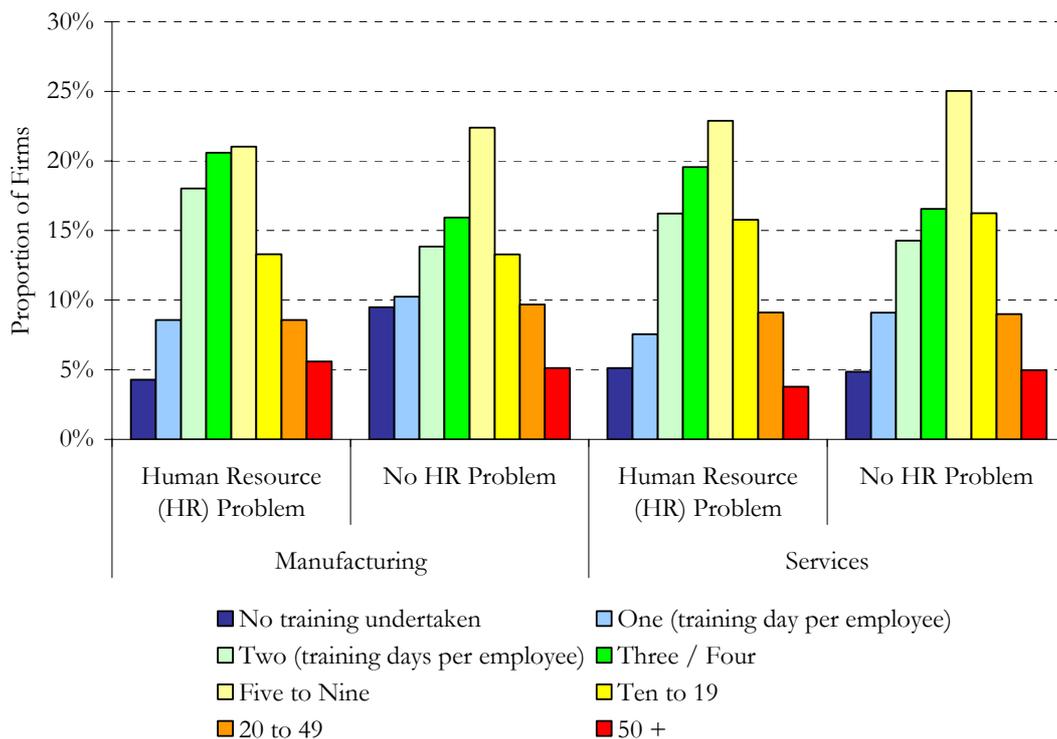
In the Table 7.2, the findings (in square brackets, i.e., []) for the sub-set of firms that identified the quality and motivation of staff as one of their two greatest impediments to innovation are reported. This shows that, relative to all firms, manufacturers that complained of this barrier appear to be especially concerned with apprenticeships and training of technical staff, and to a lesser extent with university graduates. Amongst the service firms, however, there are no noticeably large differences between the firms that reported ‘accessing and mobilising human resources’ to be a problem and those that did not. This suggests that this is a problem shared by a wider set of firms than those that identified it as one of their ‘top two’ problems, but for some it is relatively less of a problem than some other factors (or they have accepted this as a ‘fact of life’, rather than something to complain about).

The issue of human resources raises obvious questions about the division of responsibility between the state, the enterprise and the individual in the provision of an educated, skilled and motivated workforce. An interesting question is therefore whether those that did not identify ‘accessing and mobilising human resources’ as an impediment to innovation have taken on a greater training and development role themselves, as evidenced by providing a greater number of training days for their staff. Of course, whether or not a firm engages in training is a complex issue, relating to, amongst other

things: the extent to which it is undertaking activities which require specialist skills; the extent to which it is experiencing a high rate of staff turnover or growth in the number of personnel; and, its recruitment policy (such as the extent to which it is prepared to pay a premium to recruit people with the skills it requires, or whether it seeks instead to train people in house and avoid premium wages). We do not have enough evidence to look into this matter fully, and instead present a simple comparison between the number of training days per employee reported for firms in each of the three sectors which a) reported ‘accessing or mobilising human resources’ as a problem for innovation or b) those that did not identify this factor as a problem.

Figure 7.1 shows that whilst those that service firms that reported a human resource problem were no more likely to engage in training than those that did not report this problem, the great majority of firms in all the classifications engaged in some kind of training. However, the majority of firms also made relatively small commitments to training (at a few days per employee per year). There was also little difference between the commitments to training of those that did, and those that did not, report accessing or mobilising human resources to be one of their two principal problems with innovation. It is evident that, in both manufacturing and services, those firms that did not identify human resources as a problem were at least as likely to have high commitments to training as those that identified this as a problem.

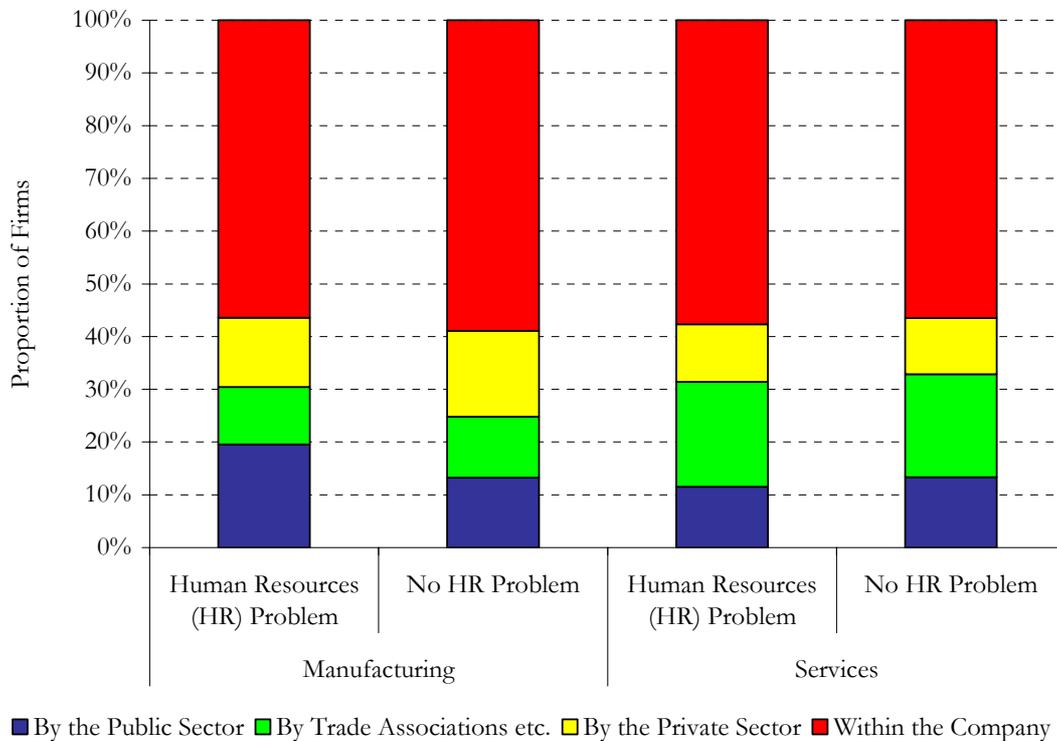
Figure 7.1 Human Resource Problems and Training Days by Sector



We now turn to the question of who should conduct the training to improve the qualifications of staff and their motivation (with respect to innovation). Here, it is notable that more than half of both manufacturing and service firms thought that the best place for this training was within the firm (Figure 7.2), and this was true whether or not the firm had identified ‘access to or mobilising human resources’ as one of its two major problems. Indeed, generally this proportion approached 60%. Relatively few

firms – generally around 10% – thought that this training should be provided by the public sector’s education and training institutions. The remainder thought that this training should, either be provided by private sector institutions, or by business or industry institutions (such as the chambers of commerce or trade associations).

Figure 7.2 Human Resources and the Best Place to Undertake Training



These results are open to various interpretations. One is that the majority of the firms do not see any effective providers for their human resource problems other than themselves – either their problems are too specific, or they do not trust others to provide the training that they require. The suggestion that the companies lack faith in public providers of education is supported by the finding that amongst those firms which only reported problems with basic or higher education, and not with either apprenticeships or training of either technical or commercial staff, nor of the motivation of their staff, the majority still thought the training to improve the qualifications of staff should be provided by the companies themselves, and less than 20% thought this training should take place in public sector institutions.

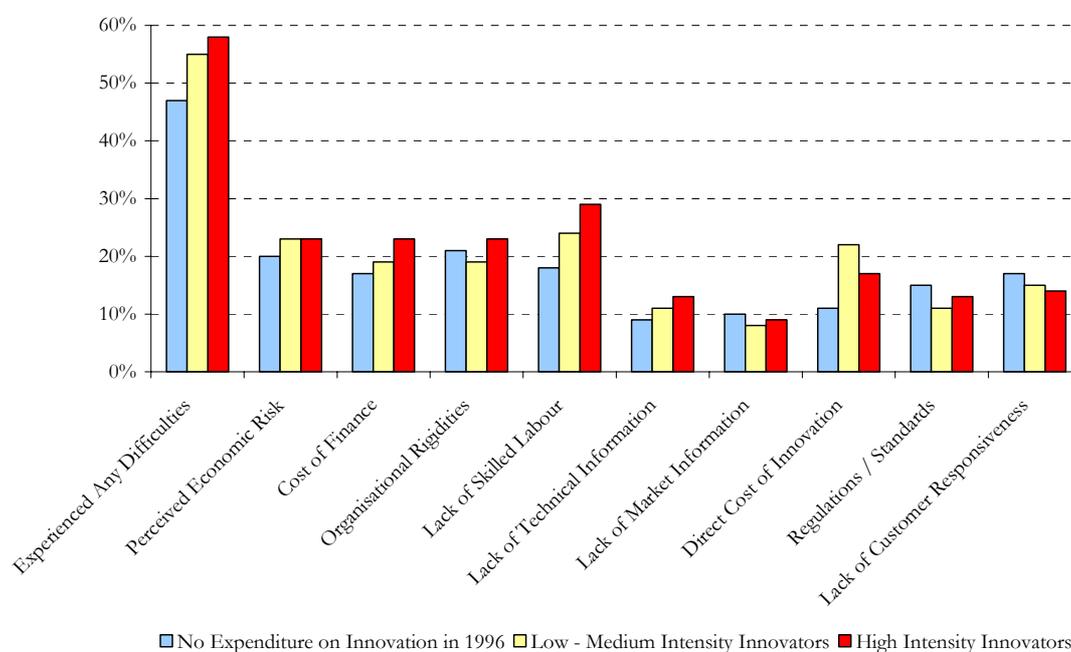
All told, these findings point to some confusion between education and training, and which institutions firms regard as appropriate to rectify the problems they encounter. Whilst a large number of firms have taken it upon themselves to commit (time and financial) resources to training to compensate for perceived inadequacies, it is clear that a substantial proportion also lack the resources and/or will to do this, even though the same companies tend to perceive the best place for the required training would be within the firm itself.

7.3 Barriers to Innovation: The 2nd Community Innovation Survey

Amongst the respondents to the second European Community Innovation Survey (CIS-2) that engaged in innovative activities, over half complained of factors hampering innovation. For this analysis, rather than divide the sample by sectors, we assess it by the intensity with which they pursued innovation activities. These intensities are found by the relative commitment of financial resources to innovation. The first group relates to those firms that reported no financial commitment to innovation (in 1996). The second group is of low and medium intensity innovators, which are the lower two thirds of the sample in terms of their financial commitment to innovation relative to their size in 1996. The final group is the high intensity innovators – these are the top third in terms of their commitment of financial resources to innovation relative to their size (Figure 7.3).

The proportion of firms reporting their innovation activities were hampered increased, rather than decreased, with an increasing commitment to innovation. And of the particular factors hampering innovation, the most frequently cited amongst the high intensity innovators was a lack of skilled labour, followed by organisational rigidities, the cost of finance for innovation, and the high perceived economic risk of innovation. These were also the more widely recognised factors amongst the low and medium intensity innovators. Amongst the firms that did not record a financial commitment to innovation, a lack of customer response to innovation was more widely identified than amongst the other groups. A lack of technical information and a lack of market information were amongst the least widely perceived factors hampering innovation in all the groups.

Figure 7.3 CIS-2 - Factors Hampering Innovation by Innovation Intensity



Overall these results show two things. Firstly, that those firms that committed more resources to innovation tended to experience more difficulties. Secondly, that the firms

experienced a variety of difficulties, although - to some extent - it is surprising how few (rather than how many) firms cited these difficulties.

7.4 Barriers to Innovation in Services: Evidence from ‘Four Sectors’ Study

The survey conducted for this project included a question which asked the businesses to rank (from not important) to (very important) the significance of 10 factors which might inhibit the extent to which they engaged in innovation or change. These factors were:

- We are too busy to innovate
- Innovation is not necessary because of previous changes or market conditions
- Customers are unwilling or unable to pay for new services
- Customers are unresponsive to new services
- The costs or risks of innovation are too high
- We lack key staff to innovate
- We lack key technologies to innovate
- Innovations are too easily copied
- Regulations hinder innovation
- Organizational structure hampers innovation

For our review of the findings, we begin with a brief overview, for each ‘sector’, of the factors identified as barriers to innovation by the businesses.

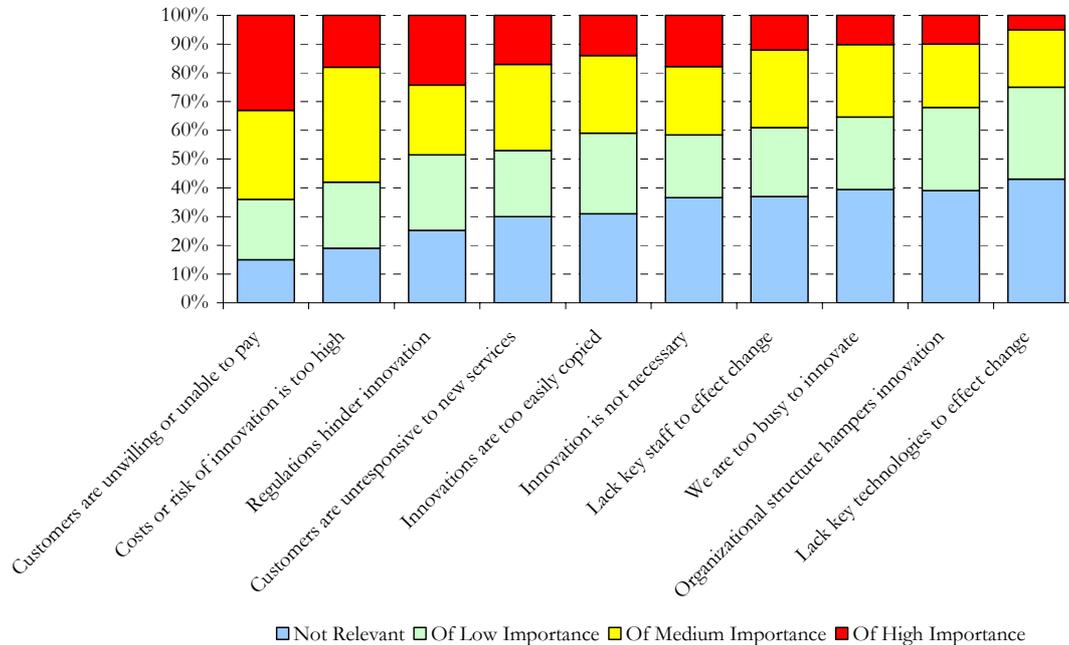
Road Transport

Amongst the various factors, the inability or unwillingness of customers to pay for new services was seen as the greatest constraint, followed by the costs and risks of innovation being too high, and regulatory barriers. Each of these was identified as being of some importance by at least three quarters of the EU road transport respondents. A third thought customers inability or unwillingness to pay for new services was a very important impediment to innovation, whilst a quarter thought this of the costs or risk of innovation. These findings are open to different interpretations. In particular, the high ranking of the inability or unwillingness of customers to pay for new services can be read in two ways. On the one hand, it might suggest a ‘blame the customer’ mentality. On the other, it might indicate the businesses have a very good knowledge of their customers and their ability to pay for new services, such that the businesses engage in a near optimal (as they see it) level of innovation, and do not engage in change that is unlikely to be rewarded. This interpretation is supported by the large number that gave some importance to customers being unresponsive to new services.

Ease of innovation imitation ranked sixth in terms of the proportion identifying the factors as an impediment of high importance. This was followed by lack of key staff. Relatively few businesses regarded their organisational structure as a barrier to innovation, and relatively few were too busy to innovate. Finally, a lack of access to key technologies was rarely identified as a key barrier to innovation. This suggests the

emphasis (or differentiator) of innovation in road transport businesses is not technology, but other ‘softer’ factors and to some extent how new technologies relate to these.

Figure 7.4 Road Transport business respondents in the European Union: Importance of Various Factors as Impediments to Innovation



A factor analysis on these results found three factors. The first relates to innovation being unnecessary due to previous innovations or market conditions. The second relates to the demand side (customers being unwilling or unable to pay for new services, and being unresponsive to innovation) as well as the costs and risks of innovation. The third relates to internal factors, notably the availability of key staff, key technologies, and having an organisational structure which hinders innovation.

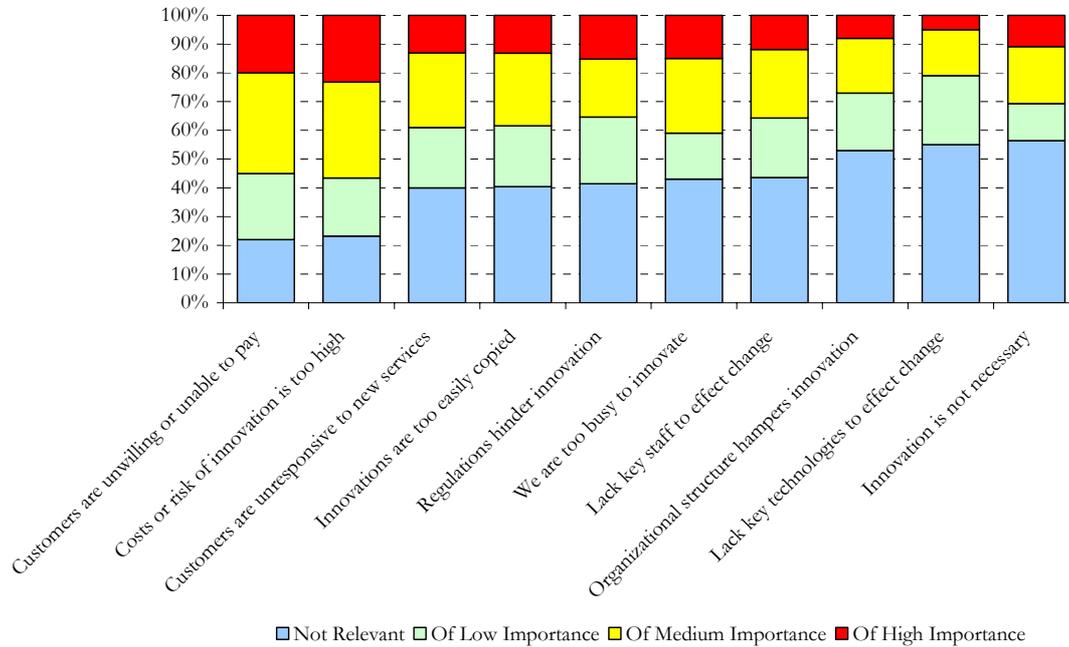
Of some interest is the comparison of EU and US businesses in terms of the barriers identified. Although we should be careful of this comparison, due to possible differences in the quality of type of the businesses that responded to the survey, it is notable that in terms of their ranking both the EU and US businesses tended to identify the same factors as the principal inhibitors of innovation. Overall, however, EU businesses were more likely to identify and grade highly most of these factors as inhibitors of innovation. We cannot know whether this reflects real differences, or differences in attitude.

Information Processing

Like road transport, customers’ unwillingness or inability to pay for new services was seen as the greatest constraint on innovation in information processing, being perceived as of some importance by almost 80% of the respondents (and as very important by 20%). The second most widespread factor was costs or risks of innovation being too high (which was the most widely identified barrier considered of ‘high importance’). The unresponsiveness of customers to innovation ranked third (Figure 7.5). On the other hand, less than half the respondents felt that it was unnecessary to innovate due to previous innovations or market conditions, and relatively few were hampered by a lack of access to technologies or a rigid organisational structure. Although just over half gave

some importance to a lack of key staff as an impediment to innovation, only 12% considered this an impediment of high importance.

Figure 7.5 Information Processing respondents in the European Union: Importance of Various Factors as Impediments to Innovation



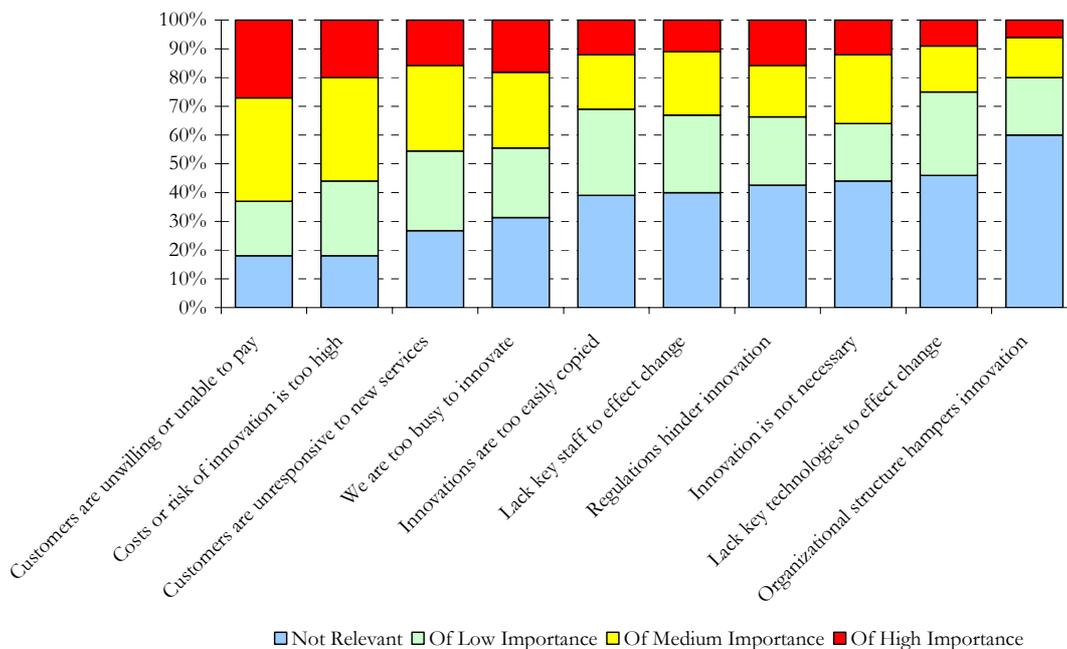
A factor analysis on these results also found a three factor solution, similar to that for the road transport businesses. The first factor was associated with innovation being unnecessary due to previous changes or market conditions, and the businesses being too busy to innovate. The second factor related to the unwillingness or inability of customers to pay for new services, together with customers being unresponsive to innovation. The third factor related to internal factors, such as a lack of key staff, key technologies and organisational rigidities.

Again of particular interest is the comparison between EU and US businesses, but again we should be cautious about this comparison due to possible differences in the samples. In contrast to the road transport sector, there was considerable variation between EU and US businesses in how they rated the different barriers. However, the biggest differences were in customers being unresponsive to innovation (which was identified as a barrier of high importance by twice as many US as EU respondents), and being ‘too busy to innovate’, which was a barrier of high importance to 15% of the EU respondents but only 2% of the US respondents. EU businesses were also considerably more likely to complain of a lack of key staff than were their US counterparts. As mentioned earlier, it is difficult to know how much these differences reflect real differences between the US and Europe, and how much they reflect differences in perception and attitude.

Design Activities

Customers' unwillingness or inability to pay for new services was again the most widely identified barrier to innovation, being recognised as of some importance by 80% of the respondents, and as very important by a quarter. The finding that nearly three quarters of the respondents complained that customers were unresponsive to innovation suggests this may not be a simple 'blame the customer' mentality, but instead suggests these businesses know the limits of their customers with respect to innovation. Also important here are the costs and risks of innovation, which were identified as of some importance by four-fifths of the respondents, and as very important by a fifth. More than two thirds also gave some importance to being too busy to innovate. Interestingly, relative to the EU businesses, US design firms were again much less likely to claim they were too busy to innovate. This contrasts with most of the other barriers to innovation, which unusually amongst the sectors we analysed, the US firms were more likely to attach high importance to as impediments to innovation.

**Figure 7.6 Design business respondents in the European Union
Importance of Various Factors as Impediments to Innovation**



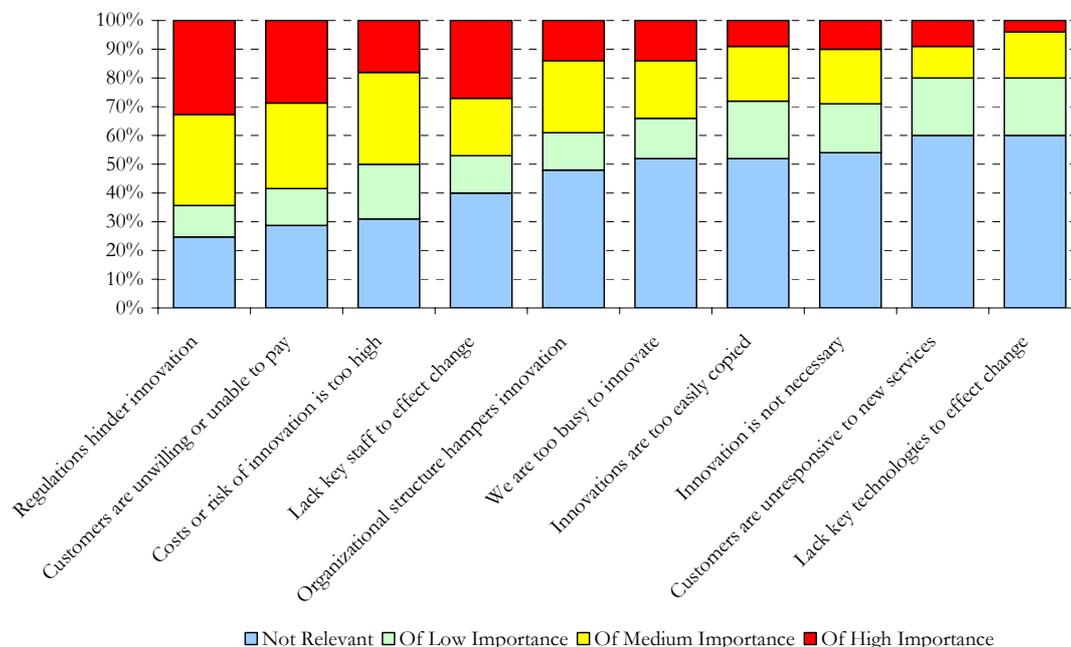
A factor analysis on the EU design sector responses found only two factors – the first related to the unresponsiveness of customers to new services and their unwillingness or inability to pay for such services. The second related to a range of internal factors, but especially to the organisational structure of the business and a lack of both key staff and key technologies.

Care for the Elderly Activities

Regulations were the most widely identified barrier to innovation amongst the care for the elderly businesses, being identified as of some importance by three quarters of the respondents and a barrier of high importance by a third. As with the other sectors, the unwillingness or inability of customers to pay for new services also ranked highly, with over 70% giving some importance to this, and nearly 30% claiming it was a barrier of high importance. The much lower importance attached to the unresponsiveness of customers to innovation suggests that in contrast to the other sectors the problem here is not so much an unwillingness to engage with innovation amongst customers, but an inability to pay for new services. The availability of key staff was widely perceived as a problem amongst care for the elderly businesses, with 60% giving some importance to this, and over a quarter identifying it as a barrier of high importance. By contrast, on 40% claimed they were inhibited in their innovation activities by a lack of access to technologies, and only 4% claimed this was a barrier of high importance.

A factor analysis on these results found three factors. The first related to being too busy to innovation, coupled with an organisational structure that impedes change and a lack of key staff and technologies. Regulations also had an influence here. The second factor related to customers being unresponsive to new services (but not, interestingly, to the unwillingness of customers to adopt new services, or their inability to pay for these), and to innovation being unnecessary due to previous changes or market conditions. The third factor was poorly defined, but weighted most heavily on innovations being too easily copied.

Figure 7.7 Elderly Care business respondents in the European Union Importance of Various Factors as Impediments to Innovation



Summary and Conclusions

Table 7.3 lists the barriers to innovation across the service sectors studied, ranking the barriers by the extent to which they were identified as being of at least some importance. Table 7.4 repeats the exercise but assesses only the extent to which these were seen as very important barriers to innovation.

Table 7.3 Extent to which the Various Factors were of some Importance as Impediments to Innovation (European Union responses only)

	Road Transport	Information Processing	Design Activities	Elderly Care
Customers are unwilling or unable to pay	85% (1)	78% (1)	82% (1)	71% (2)
Costs or risk of innovation is too high	81% (2)	77% (2)	82% (1)	69% (3)
Regulations hinder innovation	75% (3)	59% (5)	57% (7)	75% (1)
Customers are unresponsive to new services	70% (4)	60% (3)	73% (3)	40% (9)
Lack key staff to effect change	63% (6)	56% (7)	60% (6)	60% (4)
Innovations are too easily copied	69% (5)	60% (3)	61% (5)	48% (6)
We are too busy to innovate	61% (8)	57% (6)	69% (4)	48% (6)
Innovation is not necessary	63% (6)	43% (10)	56% (8)	46% (8)
Organizational structure hampers innovation	61% (8)	47% (8)	40% (10)	52% (5)
Lack key technologies to effect change	57% (10)	45% (9)	54% (9)	40% (9)

Ranking in brackets.

Table 7.4 Extent to which the Various Factors were of Very Important as Impediments to Innovation (European Union responses only)

	Road Transport	Information Processing	Design Activities	Elderly Care
Customers are unwilling or unable to pay	33% (1)	20% (2)	27% (1)	29% (2)
Regulations hinder innovation	24% (2)	15% (3)	16% (4)	33% (1)
Costs or risk of innovation is too high	18% (3)	23% (1)	20% (2)	18% (4)
Lack key staff to effect change	12% (7)	12% (7)	11% (8)	27% (3)
We are too busy to innovate	10% (8)	15% (3)	18% (3)	14% (5)
Customers are unresponsive to new services	17% (5)	13% (5)	16% (4)	9% (8)
Innovation is not necessary	18% (3)	11% (8)	12% (6)	10% (7)
Innovations are too easily copied	14% (6)	13% (5)	12% (6)	9% (8)
Organizational structure hampers innovation	10% (8)	8% (9)	6% (10)	14% (6)
Lack key technologies to effect change	5% (10)	5% (10)	9% (9)	4% (10)

Ranking in brackets.

The most significant factor in terms of overall score was customers being unwilling or unable to pay for new services, which in the European Union was identified as being of some importance by at least 70% of the respondents in each of the four sectors. At least

a fifth also claimed this was a very important barrier to their innovation activities. As mentioned earlier, this might not be a simple 'blame the customer response'; instead, it may indicate the businesses have a good knowledge of their customers' attitude to innovation and their ability to pay for new services. At a more general level, this links in with Porter's (1990) notion expressed in 'The Competitive Advantage of Nations' that demanding consumers are important for stimulating and sustaining competitive and innovative firms. It also is associated with another high ranking barrier, which is that customers are unresponsive to new services. This was particularly significant in road transport and design services, where it was considered of some importance by 70% or more of the respondents, and as very important by around 16%. By contrast, this was one of the lowest ranked impediments to innovation amongst care for the elderly businesses.

The second most important factor was the costs and risks associated with innovation, which was of some importance to 70% or more of the businesses in the four sectors, and very important to around a fifth. Regulations were a particularly important barrier in road transport and care for the elderly businesses, amongst which three quarters claimed they were a barrier of some importance, whilst a third of the care for the elderly businesses and a quarter of the road transport businesses claimed this was a barrier of high importance. Information processing and design firms were considerably less likely to identify regulations as a key barrier to innovation. Unlike evidence from CIS-2 data and from the Innobarometer,³³ where internal factors, in particular lack of qualified personnel and organisational rigidities (Commission of the European Communities 2001, 19), were rated most highly, our 'four sectors survey' tended to find *external* conditioning factors were more significant barriers to innovation (although the costs and risk of innovation, ranked second overall, can be both an internal and an external factor). This said, around 60% of the respondents gave some importance to a lack of key staff as a barrier to innovation, although, with the exception of the elderly care businesses, only about 12% perceived this as a barrier of high importance. By contrast, amongst elderly care businesses, over a quarter saw this as a barrier of high importance. Interestingly, the organisational structure of the business and a lack of key technologies were almost always amongst the lowest ranked barriers to innovation.

What might be concluded from the evidence relating to barriers to innovation from this survey?

1. The first is that there is significant variation amongst service businesses in terms of what they see as significant barriers to innovation. Care should therefore be taken in making 'blanket' statements about service innovation barriers and policies to rectify them. This echoed in a recent study in the Netherlands which noted the large differences between individual service industries as to the degree to which they encounter barriers to innovation (Van Ark et al. 2003, 47).
2. Nevertheless, on a broad level (and unlike CIS-2 and SIID data, but more in line with the Innobarometer survey) there was indication from this survey that *external* conditioning factors seem to be seen as more significant barriers to firm innovation than internal barriers, associated with, for example, the lack of

³³ And to a lesser extent evidence from the Netherlands using the SIID database which also suggests that internal barriers (score of 31) were rated slightly higher than for external barriers (score of 24) by Dutch firms in 1998 (Van Ark et al. 2003, 47).

qualified personnel and organisational rigidities. This said, there may be a degree of ‘blame the environment rather than ourselves’ attitude here. Equally, the fact that businesses identify their customers’ willingness to adopt new services as a barrier to innovation should not necessarily be read negatively – it could mean these businesses have a good understanding of their customers and their needs. However, the lack of demanding and novelty seeking customers who are willing and able to pay for upgraded, improved or novel services may be an important barrier in service innovation which enterprises find difficult to overcome. This is a matter that deserves further research.

3. The second tranche of factors however could be linked with government policy. Regulation was rated as an important barrier to innovation, especially amongst road transport operators and elderly care businesses. It could also be argued that governments could have a role in helping to reduce the costs and risks of innovation in services, the second most rated factor. However, until recently governments have avoided providing direct support for service R&D and innovation (Chapter 8).
4. Lack of key staff was not rated highly, and this contrasts with other studies which suggest human resource and training issues could be a significant barrier to innovation in service sectors. This said, around 60% of the respondents attached some importance to a lack of key staff as a barrier to their innovation activities.
5. Across the three sectors where comparison are possible (road transport, information processing and design and related activities), EU businesses tended to rate barriers as being more significant than their US counterparts. This might just indicate that EU respondents complain more or are generally more pessimistic in their attitude. However it could also point to more fundamental issues associated with the nature of the ‘task environment’ they operate in, one which is too restrictive or nurturing enough to permit growth and development.
6. Lastly, barriers to innovation should perhaps not always be seen in a negative light. Regulation can for example be beneficial in generating an environment that is conducive to innovation in some instances (for example, by sponsoring the search for solutions to problems of environmental control or by ensuring the establishment of broadband infrastructure).

8. Policy Implications: Opportunities, Barriers and Other Issues

8.1 ‘In the Dark’: Measurement and Related Issues

Before identifying possible policy initiatives in respect of service innovation it is important to recognise an old, but continuing, challenge in respect of policy formation. It is the lack adequate data, indicators and methods to analyse services and service innovation, which has been the constant refrain of researchers studying services over the years. As Greenfield noted in 1966 there is a “.... dearth of data... ” (Greenfield 1966, 10) in the services field and an “...attempt should be made to develop as much information for services as we have for goods” (Greenfield 1966, 130). It is little different today. Thus, the European Commission in December 2003 noted “.... serious deficiencies in our understanding of the structure of the services sector and the factors influencing the growth of services enterprises remain. The available statistical material does not reflect appropriately the dominant position of services in the economy....” (Commission of the European Communities 2003, 36). However welcome initiatives have been later, such as extending the European Community innovation Survey beyond manufacturing to include services, insight into services and service innovation, and in turn policy formation, are still hampered by this lack of adequate basic statistics on services and service industries, which is a prerequisite for policy formulation, monitoring and evaluation.

Innovation statistics are still strongly biased to technological innovation, and measurement of output and factor and knowledge inputs in services is one of the key areas where initiatives are needed within member states (Van Ark et al. 2003), but also on a European-wide and international level. This study, for example, has sought to compare some of the conditions of service innovation between the European Union and the United States, but has been hampered, amongst other things, by comparability of datasets. As one such initiative, further effort should therefore be made to harmonise the North American Industrial Classification System (NAICS) and NACE classification systems.

However it is important to recognise that services are difficult to study and conceptualise. It is therefore not ‘simply’ a matter of funding the collection of more data and the creation of new and more comprehensive datasets. Much more effort needs to be done by the research community in developing new but robust indicators that can actually better articulate and measure what service innovation is about, rather than simply trying to adapt old modes of thinking in relation to innovation. We consider that the study reported in this report made a contribution to this. More generally, the development of new indicators will require long term funding for the generation of a new conceptual and methodological research framework. Without it, much of policy will remain ‘in the dark’ and perhaps of little relevance to the real world through which it could enhance Europe’s competitive position.

The issue of research and development (R&D) activity within services is an important part of this issue which also needs to be raised. Current definitions of R&D activity based on the Frascati Manual still exclude much research activity which is non-artefact based. Revisions have been made to the Frascati Manual (OECD, 1994), but this needs

to be ongoing. Related activities, such as design, have also evolved over time. However, even with these revisions to encompass more service-based R&D, service companies must be made aware that certain of their activities are indeed 'R&D'. We believe that there is substantial under-reporting of R&D activities within services (and this has been exacerbated in certain member states, such as the UK, which until recently had few fiscal incentives for companies to record R&D). Evidence so far is largely circumstantial on this (however see Howells et al., 2001) but we believe it is a significant issue. Even though most service firms may not be high intensity R&D spenders, even small amounts of R&D activity will aggregate to represent a significant (un-recorded) 'addition' to European base because business services firms represent such a large proportion of total enterprises.

Policy Suggestions:

We recommend that the European Union in conjunction with its partners in the OECD and elsewhere internationally should:

1. **New Indicators:** seek to develop new indicators to better measure innovative activity within services, in particular aspects of organisational innovation not included in the CIS or other large-scale surveys of innovation;
2. **Harmonisation:** make further and greater efforts to harmonise the industrial classification systems internationally;
3. **Surveys and Databases:** and, on this basis, undertake surveys and develop databases which capture and collate these new statistical measures; and,
4. **Redefining R&D:** in particular, further rounds of work need to be done to further redefine R&D activity so it better captures service-related R&D. This also needs to be communicated in a simple but clear way to service enterprises.

8.2 Human Capital and Training

In terms of human resources and training, the training of new staff was rated more highly for business success than for the training and retraining of existing staff (except for design activities in Europe). Investment in new technology tended to be rated lower for business success than for new staff training but higher than the training and retaining of existing staff. There were however also significant sectoral variations. Staff training was particularly highly rated by care for the elderly organisations in relation to achieving business success. Over three-quarters rated very important as an investment for business success the training or retraining existing staff or the training of new staff.

As a barrier, lack of key staff was rated as being only the seventh most important barrier to innovation (although for care for the elderly it was rated more highly). As the Innobarometer survey suggests (Chapter 2), lack of skills and staff may be important for a small but significant minority of firms (between a fifth and a quarter of companies) but it is not a widespread problem. Accessing and mobilising human resources may be one of the key elements in service firms being innovative and competitive, but may be less of

a barrier across the larger number of firms surveyed in this study. However, sectoral differences are important here and for firms in people-oriented services, such as care for the elderly, lack of key staff may remain an important barrier to success. It may also be a specific issue to certain types of personnel. Evidence for the Innobarometer survey suggest that apprenticeships and training of technical and/or commercial staff may be a problem in the service trades (Chapter 2).

The implications for policy are less clear cut here and the issue of human resources obviously raises the question of the division of responsibility between the state, enterprise and society in the provision of an educated, skilled and motivated workforce. Again the results from the Innobarometer survey are useful here. There was some evidence to suggest that firms that identified human resources as a problem were more likely to engage in training, but this 'self-help' approach to the problem did not go far - about two days per employee. Policy needs to promote and stimulate the benefits of training and higher skills levels to service firms, but also needs to consider how such support might be approached. Here the evidence is much clearer. Relatively few firms thought that training should be provided by the public sector's education and training institutions, with a strong indication that the majority of firms thought the training to improve the qualifications of staff should be provided by the companies themselves.

Policy Suggestions:

In terms of policy recommendations in this field we believe that:

- 1. On-Site Training:** Based on this review, training and skills support should be more specific, centred on the: a) peculiar needs of the sectors; b) the skills required; c) provided generally in-house; and, d) associated with more bespoke training provision relating to the particular human resource needs of the firm. Much greater consideration and research should be undertaken considering the merits of 'on-site', in-house training compared with off-site training, this in turn involves the bespoke versus generalist provision of training needs. Certainly on the basis of this study in relation to the service sector, broad and homogenous training and skills based outside the firm will not be as effective in supporting service firms to be both more competitive and innovative as other more tailored, quality-led schemes.
- 2. A Training Bond:** However, there is a clear balance between the needs of the individual worker, the firm or organisation in which they work and the state in terms of wider training goals and the need for a skilled and flexible workforce. Employers fear poaching or staff once undergone expensive training paid by their current firm, leaving to get a better paid job with another firm (Section 7.2). We believe that there should be a nominal charging of the cost of training employees receiving training from their employers, associated with a 'tie-in' period which would decrease over a period five years and be paid off after that date. Employees leaving before this time would have to pay the remaining amount of training fees. Public funds could also support these schemes in a proportionate way in areas where there were skill shortages. The scheme should be provided by certified training bodies from outside the firm.

8.3 Intellectual Property Rights and Service Innovation

Wider relations in the context of intellectual property regimes of services and regulatory framework have been explored both in terms of how it may influence and shape service innovation, but also as an indicator of service innovation (Andersen and Howells, 2000; Miles et al., 2000; Blind et al., 2003). It has often been noted that services have much weaker intellectual property regimes and this might impede and restrict their innovative progress. Whereas manufacturing and science-based firms, producing tangible goods, have patents, service firms have lacked an effective intellectual property regime, associated with trademark or copyright legislation, for example, from which to protect more intangible innovations.

Recent evidence suggests that service firms do not rate the lack of effective intellectual property rights as a major hurdle in innovation (see, for example, Tether, 2003), but it could also reflect the fact that they use other mechanisms, such as secrecy, short cycle times and closely coupled with new product innovations and complex and tacit forms of work organisation (Andersen and Howells 2000). This may also explain why, although trademark and copyright data for service enterprises may have some usefulness as indicators for innovative activity in services, their applicability and wider utility, as yet, remains limited (Blind et al. 2003).

Certainly evidence from the survey indicates that at least in terms of barriers, service firms rated 'ease of copying' as only their seventh most important barrier overall with a cumulative score of 25%. Again this could suggest that firms have developed non-IPR strategies, such as secrecy or short life cycles, to overcome these difficulties, but the low status of this barrier is more likely to do with the nature of much service innovation associated with more indirect, disembodied innovations which are often tacit in form and therefore hard to copy (indeed this is often a problem internally within the firm concerned).

In policy terms, the European Commission needs to carefully monitor the situation. Firstly, for certain service sectors, such as telecommunication services or computer services (Blind et al. 2003), intellectual property right issues are important and businesses in these sectors do feel that often existing property right mechanisms are not properly aligned to the needs of the firms concerned. There have been some shifts in the reach and nature of certain mechanisms such as the extension of patents to cover certain forms of software generation and business process methods, but problems remain for firms operating in these knowledge intensive and high technology service sectors. It has been suggested in the Netherlands that the implications of changing intellectual property rights regimes for service industries need further clarification, especially in relation to software and the patenting of business methods (Van Ark et al. 2003, 74).

Secondly, as all forms of services become more knowledge and innovation intensive, more service firms may be encountering problems surrounding intellectual property rights and the protection of knowledge surrounding aspects of the innovation process. As yet, this still may be of a low level, but given the general trends towards increasing levels of innovation may become more pervasive over time.

Policy Suggestions:

It was earlier noted that much service innovation cannot normally be protected by patent legislation. Many have pointed to copyright law as an alternative, but this also has problems. One head of a leading member states Patent Office has noted that “copyright is the dustbin of IPR”. Ostensibly it is costless to gain protection, but then actually very expensive to defend such protection (a leading UK service company recently estimated that it costs a minimum of 1.5 millions euro to undertake a court action to protect an infringed copyright). Copyright in turn has grown out of the protection of artistic works and, unlike patents, protection lasts a very much longer period. On this basis:

1. **New Intellectual Property Mechanism:** We recommend that consideration is given to creating a new intellectual property right that is better attuned to the needs of services, particularly in the fast evolving digital and media service industries. Such a new measure should last between, say, five and ten years, be simple and cheap to register with a Patent Office, but also enforceable, without this being inordinately expensive. We are not seeking a modification or extension of copyright or patent law (as with the case of business process methods) but in the devising of a simple, low cost new intellectual property mechanism recognising and rewarding novelty in the area of services and non-tangible activities, without discouraging innovation diffusion over the longer run.

8.4 Barriers to Service Innovation and Growth

How can policies be formulated or reformulated to reduce barriers in the provision of new and innovative services across the European Union? Below are listed two proposals.

Policy Suggestions:

1. **Supporting Novel and Demanding Consumption Patterns:** Given the survey evidence one policy area which the E.U. and member state governments should consider schemes to encourage service consumers, particularly other firms and government itself in the all important area of business services, to become more *intelligent customers*. The lack of demanding and novelty seeking customers who are willing and able to pay for upgraded, improved or novel services seems to be a major and highly important barrier in service innovation which enterprises find difficult to overcome. Enterprises could be encouraged to seek new and different types of services, offered in new ways. Similarly, governments through procurement initiatives (such as e-procurement) could also do much to stimulate new service offerings and provision. Regulation and standard setting could also form part of this process and has been successful in areas like mobile telecommunication services and the environment where the formation of standards and the process of standardisation has proved invaluable.
2. **Overcoming and Harnessing Regulation:** Despite the positive role of regulation it can also form a significant barrier hindering innovation, particularly

in certain sectors. We may need new and novel regulation in certain areas and various studies have shown that services innovation can be spurred and encouraged by regulatory change. However, we need continued vigilance in reviewing and reducing *regulatory burden* in other areas. Regulation should not always be seen negatively in a European context, but equally it does form a burden to service industry which hinders innovation.

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Appendix Questionnaire used in the ‘Four Sector’ Survey

Survey on Services and their Development

This is a survey of services and their development. The aim is to gain a better understanding of the ways in which services compete and the difficulties they face, and to use the information gathered to inform policymaking aimed at supporting service enterprises.

The survey should take about 15 minutes to complete. We are undertaking this survey on services in the United States, Canada and fifteen European Countries and the information you provide will be very helpful to us.

Please note we will be referring to your **‘business’**. This may be a ‘not-for-profit’ operation, but should be understood as relating to an organisational unit that has a significant degree of autonomy in decision-making, even though it may be owned by another company or organisation, and may therefore be part of a larger organisation or set of businesses.

The information you give will remain strictly confidential. Only aggregated results will be presented in the published reports. If the exact figures are not known to you, please provide estimates.

1 Please tell us the name of your business.

Name of Your Business q1_name (NB variable is a string):

Year Established? q1_yrest (NB code 0 if before 1998 but exact year is not given)

2 Please tell us your name and position in the business (e.g., Managing Director).

Your Name: q2_resp (NB variable is a string)

Your Position in the Business: q2_posit (NB variable is a string)

Telephone number or email address: q2_conta (NB variable is a string)

3 How many people including directors work in your business? (Count each part-time worker as half) Exact figure q3_emp_e: OR, failing that, ✓ one of the following:

q3_empsz ...

1 or 2 [1] 3 to 9 [3] 10 to 19 [10] 20 to 49 [20] 50 – 249 [50] 250+ [250]

4 Please provide a brief description of what your business does?

Outline of your “area of business”: q4_area (NB variable is a string)

- 5 Considering your activities and compared with three years ago, to what extent have the following changed? (✓ one on each row)

	Remain unchanged ↓	Have changed but only slightly ↓	Have changed to a significant extent ↓	Have changed completely ↓
q5_prods The products or services that your business provides?	[0]	[1]	[2]	[4]
q5_procs The ways in which the services you provide are produced?	[0]	[1]	[2]	[4]
q5_deliv The ways in which the services you provide are delivered?	[0]	[1]	[2]	[4]
q5_techs The technologies you use to you produce or deliver services?	[0]	[1]	[2]	[4]
q5_skill The skills of the workforce used to produce or deliver services?	[0]	[1]	[2]	[4]
q5_orgst The organisational structure of your business?	[0]	[1]	[2]	[4]
q5_curel The way in which you inter-relate with your customers? (e.g., through the formation of collaborative partnerships, etc.)	[0]	[1]	[2]	[4]
q5_curel The way in which you inter-relate with other businesses? (e.g., through the formation of collaborative partnerships, etc.)	[0]	[1]	[2]	[4]

- 6 Please describe the most significant change to your business, such as the introduction of new services, new means of producing or delivering services, new organisational structures, or new ways of interacting with clients or other organisations that was introduced during the last three years?

Q6_innov (NB variable is a string)

- 7 To what extent is investment in new technologies important to your business?

Not Important	Of Low Importance	Of Medium Importance	Crucial / Very Important
[q7_ntech = 0]	[1]	[2]	[4]

- 8 To what extent is it important to train or retrain existing staff in your business? []

Not Important	Of Low Importance	Of Medium Importance	Crucial / Very Important
[q8_tr_es = 0]	[1]	[2]	[4]

- 9 To what extent is it important to train new staff entering into your business? []

Not Important	Of Low Importance	Of Medium Importance	Crucial / Very Important
[q9_tr_ns = 0]	[1]	[2]	[4]

- 10 How significant are the following in restricting the extent to which your business engages in innovative activity, that is the extent to which you engage in the development of new or significantly changed services, new means of producing or delivering services, new ways of inter-relating with clients or other organisations, and changes to the organisational structure of the business?

	NOT Important	Of LOW Importance	Of MEDIUM Importance	Of HIGH Importance
q10_none Previous changes and/or our market conditions don't require that we innovate or change, so we don't	[0]	[1]	[2]	[4]
q10_busy We are too busy / we just don't have the time	[0]	[1]	[2]	[4]
q10_cost The costs or risks of innovation are too high	[0]	[1]	[2]	[4]
q10_cust Customers are unresponsive to new services	[0]	[1]	[2]	[4]
q10_pay Customers are unwilling or unable to pay for new services	[0]	[1]	[2]	[4]
q10_copy Innovations are too easily copied or imitated	[0]	[1]	[2]	[4]
q10_orgs It is difficult to innovate with our organisational structure	[0]	[1]	[2]	[4]
q10_staf We lack key staff necessary to effect change	[0]	[1]	[2]	[4]
q10_tech We lack the technology to effect the desired change	[0]	[1]	[2]	[4]
q10_regs Regulations make innovation too difficult or too costly	[0]	[1]	[2]	[4]
Other – please explain: q10_oth – 1 if something else is identified; 0 if nothing else is identified q10_o_d – details – variable is a string				

- 11 Which of the following best describes where are your customers are? q11_mkt

Mainly within the local area*	Mainly within your region	Spread across the country	Spread across the Europe Union #	Spread across the World
[1]	[2]	[3]	[4]	[5]

* Local area is 50kms from your main place of business. # US Team = "North America"

- 12 Which of the following best describes the type of services you provide? **Standard services** are those that do not change between individual customers. **Customised services** are those that are changed for each individual customer.

Only Standard Services	Mainly Standard Services	A Mixture	Mainly Customised Services	Only Customised Services
[q12 stan = 1]	[2]	[3]	[4]	[5]

- 13 How many direct competitors do you have? ✓ one

None	One or Two	A Few (3 or 4)	Several (5, 6, 7)	Many (8 or more)
[q13 comp = 1]	[2]	[3]	[4]	[5]

- 14 Have new competitors entered your area of business in recent years?

No, None	One or Two	A Few	Several	Many
[q14 ncom = 1]	[2]	[3]	[4]	[5]

15 How important do you regard the following to the success of your businesses?

	NOT Important	Of LOW Importance	Of MEDIUM Importance	Of HIGH Importance
q15_pric Competing on price / Providing relatively low cost services	[0]	[1]	[2]	[4]
q15_deli The rapid or timely delivery of services	[0]	[1]	[2]	[4]
q15_qual The quality of the services provided	[0]	[1]	[2]	[4]
q15_vari Having a variety of delivery channels	[0]	[1]	[2]	[4]
q15_rang Providing a full or broad range of services	[0]	[1]	[2]	[4]
q15_nser The introduction of new services	[0]	[1]	[2]	[4]
q15_crea Creativity or flair in the services provided	[0]	[1]	[2]	[4]
q15_spec Having specialist knowledge or abilities	[0]	[1]	[2]	[4]
q15_cust Paying attention to individual customer or client needs	[0]	[1]	[2]	[4]
q15_repu Having an established reputation	[0]	[1]	[2]	[4]
q15_mktg Having marketing or promotional skills	[0]	[1]	[2]	[4]
q15_flex Maintaining organisational flexibility / our ability to adapt	[0]	[1]	[2]	[4]
q15_skil The skills of our management and workforce	[0]	[1]	[2]	[4]
q15_tech Using of advanced or recently introduced technologies	[0]	[1]	[2]	[4]
q15_regs Fulfilling standards or regulations	[0]	[1]	[2]	[4]
q15_org The organisational structure of the business (e.g., number or location of our sites of business)	[0]	[1]	[2]	[4]
Other – please explain: q15_oth if something else is identified; 0 if nothing else is identified				
q15_o_d – details – variable is a string				

16 Which of the following best describes your growth objective in the next 5 years?

Become Smaller	Remain the Same Size	Grow Moderately	Grow Substantially
[q16_grow = 1]	[2]	[3]	[4]

17 Which of the following best describes your business? q17_type

A sole trader, independent company, or partnership	An independent 'not-for-profit' organisation	A wholly-owned subsidiary of another company	A partially owned subsidiary or joint venture	Part of a larger group of 'not-for-profit' organisations
[1]	[2]	[3]	[4]	[5]
That is all - Thank you		Please answer the three questions below		
Please name your parent organisation			q17_par (NB variable is a string)	
Please state the country of its headquarters			q17_p_c1 (NB variable is a string) q17_p_c2 1 if same as country of business; 0 otherwise	
Please estimate the total employment in the group of organisations of which you are part			q17_p_sz	

Thank you for participating in this survey