Research and Development Needs of Business Related Service Firms

RENESER Project

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Foreword

The impetus for the study reported here was generated by a growing recognition of the apparent paradox between the longstanding focus on policies and support for technological R&D in manufacturing industries in Europe and the increasingly services-oriented nature of business and enterprise in the region. Whilst few would quarrel with the notion of policies designed to enhance the innovation and R&D capacity of European manufacturers, it may be conjectured that few would argue seriously that such supports should be withheld from a services sector that has been a crucial source of employment and growth in most European economies throughout the past decade and a half. With a sharpening focus on innovation and R&D as key components in competitiveness, and a growing acknowledgement that a dynamic services sector will be at the heart of Europe's future growth, it is clear that an enhanced comprehension of the nature of innovation in the services industries - and a better understanding of the role of policy in stimulating and supporting R&D activity here - is both timely and potentially of considerable reward.

Against this backdrop of burgeoning interest in R&D and innovation and the role of services firms in European performance, the Research and Development Needs of Business Related Service Firms (RENESER) project was established by the European Commission's DG Internal Market and Services and charged with two central tasks: first, to undertake an examination of the apparent 'underinvestment' (when compared with US counterparts) of European business service firms in R&D; and second, to explore the extent to which current publicly-funded R&D support programmes are configured to meet the needs of European business services. The study was operationalised via a process that embraced literature review and secondary statistical analysis, and most importantly by the development of detailed case studies in selected segments of the services industries.

The outcomes and recommendations from the research are, of course, reported in detail in the text below. However, the authors would like to take the opportunity here to extend our thanks to all those informants in the case study companies that gave so generously of their time and effort in arranging interviews, providing supporting literature and commenting on notes and drafts. We also wish to offer our thanks to Commission officials (notably Mr Ronald Mackay) involved in sponsoring and supporting the study, and to expert reviewers (especially Professors Marie-Christine Monnoyer and John Bryson) and participants involved in a final workshop convened in June to discuss an earlier version of this report. The inputs of all external contributors and reviewers deserve our earnest gratitude and have resulted in a much improved study that we hope will be of interest to policy makers, scholars of innovation dynamics, and not least, managers and innovators in the services industries.

Executive summary

In 2005 the European Commission launched a study on the quantitative and qualitative analysis of the research and development activities of service providers in Europe. It also aimed to assess the work undertaken by them in national and EU research and innovation programmes, and to identify promising areas for future research activities.

The RENESER study presented here deals with the REsearch and development NEeds for business-related SERvices. It focused on two key issues:

- the apparent underinvestment of individual European Business-Related (BR) service firms in R&D and
- the degree to what public R&D expenditure is satisfactorily addressing the real R&D needs of service firms.

The authors' main conclusions are the following:

- Some service firms do perform "classic" (i.e. technological) R&D and use classic R&D performed by others. However, across the board, services – including most Business Related Services - are still poor performers of classical R&D. Given the sheer size of the service industries, and the ambitious Barcelona target, boosting service-related "classical" R&D conducted both within firms and across 'systems of innovation' will be crucial for meeting the Lisbon goal and enhance competitiveness of Europe.
- Services R&D is widely underestimated. This is due to at least five factors:
  - the process of managing innovation in most services firms is different from the more "standardised" approach in industrial sectors which rely heavily on technological R&D;
  - a large amount of services' "classic" R&D activity is hidden behind labels such as business development, service improvement, etc. without being explicitly recognised as services R&D;
  - many service firms engage in R&D-like activities that fall outside, or at the boundary of the classic understandings of R&D
  - the de facto exclusion of social science research from R&D statistics;
  - in manufacturing firms, R&D which is aimed at development of product related services seems to be a forgotten category.

These definition and measurement problems are persistent, and obscure the contribution of services to innovation, productivity and economic growth.

- Increasingly, leading-edge service firms show some form of structured attention to management of services' R&D and service innovation activities. Although formalized service R&D strategies, budgets and processes are still lacking in most cases, there is a trend in quite a few of the larger BR service firms analysed in this study towards some formalisation of planning, management and resourcing of services R&D&I. However, formalised, service-only R&D is the exception rather than the rule.
- Most service firms are poorly linked to the science base and innovation and R&D programmes. This partly results from an (often implicit) manufacturing bias in

existing R&D and innovation policies. Apart from some BR services, innovative service firms are less likely to receive public innovation support than are their manufacturing counterparts. There is considerable room to improve R&D collaboration between service firms and research organisations, not least in BR service industries.

- There is clearly room to improve the way in which we facilitate and support services R&D and innovation as part of wider innovation systems. As well as directly shaping R&D and innovation policies, this also requires examining and designing policies with other primary objectives (e.g. education and training, environment, intellectual property, public services and procurement, as well as other areas). Furthering R&D and innovation in (business-related) services requires a systemic perspective. This also implies going beyond the market failure argumentation that is commonly used to justify policy interventions.

However, the study also highlights the fact that services in general, and Business Related Services in particular, are extremely varied; this implies that they should not be treated as a homogeneous category of businesses. Policy initiatives, and research programmes alike, will have to be sensitive to differences across (BR) services sectors and firm types, and be prepared to take these into account in designing and implementing interventions and measurement instruments.

The study concludes that Europe is suffering from an underdeveloped services R&D and innovation culture, and a lack of pro-services R&D and innovation mind-set on the part of policy makers. Creating an innovation culture that is more suited to services' R&D and innovation (in firms, in industries, in policies, and society-wide) is crucial to successfully improving competitiveness of services in Europe.

A number of suggestions are made for improving research and statistics into service R&D and innovation, dealing mostly with defining and measuring service R&D, managing service R&D and innovation at firm level, and the way services R&D is managed from a macro or systemic policy perspective.

The study also raises some wider policy implications. These include:

- Creating a more pro-service innovation culture at different levels: enterprises, innovation managers, researchers, workers and policy-makers;
- Promoting studies, debate, research and statistics.
- Assessing the sectoral balance of R&D programmes and innovation policies.
- Identifying and promoting best practice – and hence supporting policy learning in services' R&D and innovation policies.
- Promoting skills, business models and voluntary standards in R&D and innovation in (BR) services
- Screening of relevant Commission policies to assess the contribution to service innovation.

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1 Introduction

1.1 Where is RENESER all about?

RENESER or Research and Development Needs for Services is about the following two issues:

1. Underinvestment, or 'R&D deficit', of individual European business related service firms in R&D. More specifically, this is associated with the question: "Why (and to what degree) is the R&D performance of business-related services in the EU lagging behind other (mainly) manufacturing industries and the US?"

2. Links between (business-related) service firms and the existing science base. Again a more specific question can be posed here: "To what extent do service firms benefit from public R&D expenditures?"

The first question is largely based on the observation that, given the sheer size of the grand services sector alone, much of the Lisbon/Barcelona 3% R&D target should in practice be met through services R&D.[1] It has been highlighted that 50% of value added in the EU economies stems from services, although these services only account for 13% of R&D expenditures. This observation indicates that (business-related) services are clearly lagging in terms of R&D performance of is there and this needs proper explanation. The more so as R&D expenditures of private service firms in the US are considerably higher. This raises numerous questions as to how European service firms are currently dealing with R&D in the first place and why their observed R&D performance is so low.

The second related question is derived from the idea that low private R&D spending in services is not necessarily being compensated, or offset, by public spending on R&D relevant to service firms. Public R&D expenditures are generally not well targeted at the needs of service firms. This not only needs to be substantiated, but raises questions as to what degree public R&D expenditures are satisfactorily addressing of the real R&D needs of service firms. It also raises the question of what policy options are available to improve on this current predicament.

1.2 Services are ubiquitous, except in R&D statistics

Services are ubiquitous; are perceived as key to the much needed productivity growth (and hence economic growth) of advanced industrialised economies; and, pivotal to the development of a truly knowledge-based economy. Paradoxically, however, it is these very same activities, that seem hardly to be part of this process as they perform so little of R&D themselves. A combination of factors can at least partly explain this apparent deficit, or mismatch. There is evidence that service firms are more inclined to invest in various forms of organisational innovation than investing in R&D aimed at technological innovation (Howells and Tether, 2004). These activities are not adequately covered in regular R&D statistics, not least because R&D in service firms is often not formalised, is managed

[1] "The EU target of devoting 3% of GDP to research and development will be less difficult to achieve if the services sector plays a larger role, reflecting its overall economic weight" (COM (2003) 747 final, p. 21).

differently (e.g. through new business development units, temporary project teams), or is simply not labelled as R&D by those performing it (though it does seemingly fit within the Frascati Manual definition of the construct). There are also reasons why service activities may be sluggish in performing R&D; many services firms are small-scale; their core functions may not be ones where a great deal of innovation could be expected[2]; and they may still often be relatively sheltered from international competition.

A problem however remains. Certainly numerous studies have pointed to ways in which much service R&D and innovation are intrinsically different from manufacturing R&D and innovation (for example, the relative importance of non-technological or for that matter organisational innovation; Howells and Tether 2004). Yet this is obviously not the whole story. The level of private R&D expenditures in services in the US is considerably higher than that of the EU. This then begs the question of "How is it that private R&D levels in service industries in the EU are substantially lower than in the United States (i.e. US 0.92 % of turnover compared to the EU of 0.19% in 1999)?"[3] Furthermore, and particularly worrying, though the divergence is evident in most service industries, the deficit is seemingly most pressing in the Business Related services (BR services, see section 1.6 for a definition), especially among the knowledge intensive sections of these activities. Research has shown (e.g. Miles et al., 1995; den Hertog, 2000) that the latter subcategory is pivotal in triggering and supporting innovation in key client sectors in manufacturing, market and non-market services. Thus, there are likely to be 'knock-on' effects from any shortfall in innovation in these services.

1.3 The policy context

The European Commission and the OECD – in addition to some individual lead countries - have only relatively recently embarked on services R&D and innovation policy and have only now started to include services innovation in its initiative programmes and guidelines, mainly from an horizontal point of view.

In 1998, the European Commission (1998) established the need to develop an innovation policy that considers business services requirements. This notion was extended and developed in the Communication on the competitiveness of business-related services (European Commission, 2003). In this Communication the relatively low level (as compared to the US) of R&D in BR services is highlighted. The Communication, adopting the enterprise perspective, mainly deals with furthering the competitiveness of BR services markets essentially through 'flanking' policies improving the competitiveness of European enterprises. One of its paragraphs reads as follows: "Services companies show a high level of innovation, and are often the leading edge users of advanced technological developments. Furthermore, knowledge service activities (e.g., management consultancy, computer services, R&D services) act as catalysers of innovation processes in the entire

[2] This is always debatable in practice, but is the received wisdom in many quarters. In some cases e.g. the core functions of some services are highly constrained by regulatory and other constraints.

[3] As the 2003 EU Communication on business related services notes: "Some of Europe's most innovative companies are to be found in the business-related services, but the overall level of R&D in these sectors is generally low and lags substantially behind the US. Whilst the EU economy has developed into a services economy in the last decades (see chapter II), market services still account for a relatively small amount of total business expenditure on R&D. The EU average in 2001 is 13 % - with large differences across Member States" … "The corresponding US figure is 34 %, so even if the R&D expenditures of services enterprises have grown substantially since 1991, the gap to the US has widened in the same period."

economy. Some of Europe's most innovative companies are to be found in the services sector, but the overall level of R&D in this sector is generally low. The level of R&D in services lags substantially behind the US. Policy innovation initiatives should promote both specific actions oriented towards services activities (e.g., role of organisational service innovation), and more active participation of services companies in R&D programmes. The involvement of services companies in the national and European R&D Programmes should be improved to address their specific problems and needs. The EU target of devoting 3 % of GDP to research and development will be less difficult to achieve, if the business-related services sector plays a larger role, reflecting their overall economic weight".[4] This text exposed the need for specific policy approaches and mechanisms in the service realm, although the goods-services interdependence is strongly recognised.

More recently, the European Commission announced a strategy to promote innovative services in the EU in a recent communication (European Commission, 2005). In this document, it was stated that "the service sector plays an important role in growth and new jobs. At present, innovation in services is mainly driven by new offerings that respond to customer demand. But increasingly services are also driven by higher research investment and depend on the adoption of new technology. Recognising their increased importance for the European economy, by the end of 2006 the Commission will define a strategy to promote innovative services in the EU, based on the work and policy recommendations of the European Forum on business-related services. Innovation support mechanisms will be geared to the specific needs of services and specific efforts will be made to measure service-based innovations better."

Further, the process of economic reform that coincides with putting the Lisbon agenda in practice has led to the widely discussed and amended Services Directive (European Commission, 2006). This (still is) an ambitious overall legal framework that should pave the way for realising the internal market through removing legal and administrative barriers for quite a number of market services.[5]

The OECD has also summarized in various documents (OECD, 2005a; OECD 2005b and Pilat, 2001) its political policies regarding the horizontal promotion of services innovation, as confirmed by the majority of its participating countries. In fact the OECD declared itself in favour of a generic – non-specific – policy for services. The cited document also acknowledges the lower use of public funds by services companies that could learn from best practices in specific services programmes launched by governments of countries such as Finland, Norway, Sweden or Ireland. The policies identified by the OECD are the following: development of business environment related to ICT, development of software industries, development of human resources, clustering and networking, R&D investment, reinforcement of services SMEs and the start-ups, standards and intellectual property rights.

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[4] A challenge in similar wording (p. 21) was articulated as follows: "A greater direct involvement in collaborative projects, together with the high tech industries, could result in more rapid development of technologies as well as a faster deployment of new technologies. This involvement of service companies in the Research Framework Programme could also be increased by inclusion of appropriate topics in the Work Programme. The EU target of devoting 3% of GDP to research and development will be less difficult to achieve if the services sector plays a larger role, reflecting its overall economic weight".

[5] The Council end of May 2006 reached political agreement on a draft (amended) directive which will now go to the European Parliament for second reading in the European Parliament with the aim of adopting a final text during the Finish Presidency in the second half of 2006.

1.4 Two contrasting perspectives on R&D and services

Having sketched out briefly the central issues at stake, as well as some of the policy context surrounding it, two contrasting perspectives on R&D and services need to be flagged here. The first is that R&D (and technological innovation more generally), is un-important to service activities, and this is reflected in, and confirmed by, R&D statistics in terms of their low level of R&D activity. On this basis, if there is any focus on studying innovation in services (and many still question this), the emphasis should be on looking at non-technological innovation.

The second perspective, argues that R&D may have a more important role than hitherto acknowledged. R&D may be 'hidden' in services for four reasons. Firstly, that the current Frascati definition of R&D is too narrow and inflexible to pick up research activity within service businesses (such as relevant software activities). Secondly, service businesses are not good at acknowledging themselves (for historical, managerial, institutional, policy and fiscal reasons) that they undertake R&D. Thirdly, there is potentially a significant amount of 'service' R&D performed by manufacturing firms that is, either classified as being 'manufacturing' R&D, or not classified as R&D at all (linked to the earlier point). Lastly, national statistical agencies have had difficulty in identifying R&D activity within service industries because they have traditionally been fragmented, dispersed and are small-scale activities that cut across large sectors and for these reasons have not received priority in sampling frames[6]. Nevertheless, even despite these factors associated with the hidden nature of service R&D, R&D activity within services continues to grow[7], as reflected by e.g. OECD data. For both sets of these reasons, its hidden nature but continued growth, we should examine and analyse the role of R&D in services.

Clearly more research does need to be undertaken in non-technological R&D in services (and indeed manufacturing). However, the role of R&D, simply via its growth in services, does suggest that it does play an important and increasing role in service activity. Moreover, the first perspective assumes that R&D is closely linked to technological innovation; however in services it may be have a much more major role in non-technological innovation.

Do we have to start from scratch then? No, in RENESER we have benefited from, the considerable body of services' research that is already available. However, this material is not always be equivocal. There is, for example, now much material indicating how services' R&D and innovation may differ from that of manufacturing industry. Innovation in services is believed to be more multi-dimensional and organisationally oriented than manufacturing innovation[8]. There is also evidence to suggest that it is common for services R&D levels to be somewhat lower than those of comparable manufacturing firms – and that EU services under-invest in R&D compared to their US peers. What is not so clear, however, is what

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[6] For example, standard errors for R&D expenditure are recognised as being much larger in UK service industries than in UK manufacturing sectors (ONS, 2003)

[7] Between 1990 and 2001 service sector R&D grew at an average annual rate of 12% across the OECD compared with approximately 3% for manufacturing (OECD, 2004).

[8] This is reflected in most definition of service innovation such as the one used in a recently finalised multi-annual services innovation project in which service innovation was defined as "a new or considerably changed service concept, client interaction channel, service delivery system or technological concept that individually, but most likely in combination leads to one or more (re)new(ed) service functions that are new to the firm and do change the service/good offered on the market and do require structurally new technological, human or organisational capabilities of the service organisation" (see van Ark et al, 2003).

underlies the relative low R&D-levels in EU services and more particularly in BR services? Do EU services have needs for R&D that should be better met, if they are to be more competitive and of more benefit to EU industry in general? Is it also partially a measurement problem? Thus, do EU services undertake R&D-type activities that are not formally covered by the existing Frascati definition of R&D (OECD, 1994) – the 'hidden nature' of service R&D activity? It is not obvious, either, whether lower R&D levels of individual firms are the only key issue here. As R&D and innovation is mostly a joint effort, and in our view requires a systemic perspective (see also den Hertog, 2000), the ways in which BR services are able to tap into external bodies of knowledge, and vice versa, may also be a key issue explaining this process as well. There are indications, though, that most national and regional innovations systems, and the actors that populate them, are not well suited to cater for services R&D and innovation. These and similar questions will be taken up when we present the outcome of the RENESER-project in the remainder of this report.

1.5 Scope of RENESER

In RENESER we have analysed, in as much depth and detail as possible, the following sets of questions:

- Whether and how far the R&D deficit is a reality, rather than a measurement artefact, whether it is offset by "non-standard" innovation-directed activities, and what the dynamics are that underlie the answers to these questions?
- How far the R&D deficit of these businesses is offset by external knowledge providers through participation in public R&D programmes?
- How is R&D in BR services actually shaped in practice, both in terms of private expenditures on services R&D (i.e. the private spending workpackage) and in terms of strategy and organisation of R&D by BR service firms? The latter includes the considerations regarding the external acquisition (both public and private knowledge base) of research and know how and the actual R&D needs of the service firms examined.
- What is the actual match or mismatch between private and public R&D expenditures, especially the degree to which the latter (generally perceived as low) does address the actual R&D needs of this category of businesses and how these public R&D spending impacts upon innovation and competitiveness?
- What are the future needs in terms of the key research areas for BR services and the policy, analytical and statistical actions needed to target more precisely the R&D deficit in European BR services?

Additionally, the project team decided to support and deepen the overall analysis on four particular themes i.e.:

1. The need for a specific R&D policy oriented towards services, including the validity of the market failure argument in supporting services R&D (The rationale for services R&D and innovation policy, see den Hertog et al, 2006)
2. Identification of the research themes in which service companies are engaged in publicly funded R&D programmes (research themes covered through public R&D programmes, see Rubalcaba and Gallego, 2006).

3. The nature and extent of technological R&D activities associated with service functions, as performed by product-based manufacturing firms (services R&D as performed by manufacturing firms, see Meiren, 2006a)

4. The potential pivotal role of the sub-sector NACE 73 (R&D services), which is likely to be a-typical as it might function as a (private) knowledge base exploited by other BR services (role of R&D services in service innovation, see Howells, 2006).

In the original proposal it was further proposed to highlight in the study the elements as given in the box 1.1 below. These merely underline that our basic concern and point of departure is R&D in BR services and related R&D and innovation policies. We will in this report focus on technical R&D (sometimes referred to as 'classical R&D') in BR service industries (see section 1.6), including manufacturing firms with important service R&D activities (sometimes referred to as 'hybrid firms'). As the distinction between technical R&D, non-technological R&D and innovation is fuzzy – indeed they mostly reinforce each other – softer types of R&D and innovation are hard to miss and therefore discussed as well, especially in the case studies. However, organisational learning and more or less standard improvements of business processes are excluded from our definition of services R&D and innovation and policies aimed at facilitating service R&D and innovation. Finally, we have tried to include as many BR services as possible. In practice however, the scarce statistics on service R&D and innovation is available for this subset, let alone individual BR service industries. We therefore sometimes discuss services in general or important subset of BR services such as business services. Some of the findings on R&D and innovation in BR services can be used more widely. We will indicate this where appropriate.

BOX 1.1: ISSUES HIGHLIGHTED IN THE RENESER STUDY

Real indigenously generated growth: The rise of specialised service functions (in manufacturing and market and non-market services) has encouraged service innovation and has in turn stimulated R&D activity to support these activities and functions. As such, there is a real set of underlying reasons and factors, why there has been growth in service R&D and this needs analysing.

Real externally generated growth: Outsourced R&D i.e. services R&D that is performed by BR service firms for other services and manufacturing industries, which helps to drive innovation in other industries. This helps the growth of NACE 73 the R&D service industry and studies has shown the pivotal role that this sector plays in linking with the public knowledge base (see Miles et al, 2003).

Hidden growth: Despite this, as noted above, there are a number of factors why service R&D has remained hidden or unrecorded by statisticians and policymakers. In addition, we need to be clear about what we are seeking to measure and record. Are we seeking to record R&D in service industries or R&D in service functions (which covers both service and manufacturing and other industries)? At the very least the inter-linkages between the two need exploring.

Service firms as consumers of R&D services: We have focused so far here on R&D in a supply-side context, but we also need to recognise service firms/organisations as consumers of R&D services. We therefore need to explore how well service businesses are at searching for, buying, absorbing and using R&D for competitive advantage. Circumstantial evidence suggests that services are in-experienced consumers of R&D expertise.

The link between R&D and service innovation: Linked to the above point, there is still little notion of how service firms use R&D within the innovation process. We therefore need a much clearer idea of the nature and extent that services innovation depends on R&D. In addition, because R&D activity within services has been largely hidden, we still do not have a clear idea as to how R&D activity is managed or organised within service businesses (or indeed in relation to service functions). Should we conceive of service R&D being organised like manufacturing R&D? Or should we be looking at new models of R&D organisation and operation in relation to services? Thus, an initial, but helpful categorisation of how the R&D function in services – and indeed the wider innovation function - is organised is provided by Sundbo and Gallouij (2000)[9].

The use of R&D as a strategic tool by service firms: However, the way that R&D is structured, organised and used by businesses in turn crucially depends on the strategic intent and/or strategy of the firm. Different firm strategies are likely to give rise to different service innovation strategies or technology strategies for service firms. One of the examples where research has focused on the technology strategies adopted by service Enterprises is included in the German Fit for service benchmarking programme where four technology strategies by service firms are discerned i.e. pioneer strategy, imitation strategy, niche strategy and co-operation strategy (see Bullinger and Ganz, 2001). However, as yet, there has been very little research into the innovative strategy of service firms and how this may fit in with the generation and use of R&D by such firms.

Service R&D in a wider systemic context: It has been noted elsewhere of the poor institutional links of the service sector with wider national R&D and innovation policy and infrastructure (van Ark et al., 2003) and their generally poor links with the science base (see Miles et al., 2003). In this context it is therefore important to stress that we cannot study service R&D as a purely isolated phenomenon. As such, we should analyse and interpret it in systemic terms and hence study carefully how service firms link up to, and interact with, both private and public bodies of knowledge. The paradox is that whilst much of the service sector has poor links with the formal public science and knowledge base, KIBS firms often play a role as facilitator, carrier and source in innovation processes within the wider economy. There may be underlying demand side issues here for BR services in terms of little competition, conservative clients and so on, and indeed this picture is likely to vary between sectors and countries (Mason and Wagner, 1999).

Service R&D and its policy context: Lastly, and related to the need for a systemic view of service R&D, we need to recognise the existing policy dimensions associated with stimulating and providing for R&D in services. Thus, market failure in services R&D has given rise to government policies in services as much as in manufacturing, although other types of failure are relevant as well.

1.6 Defining business related services

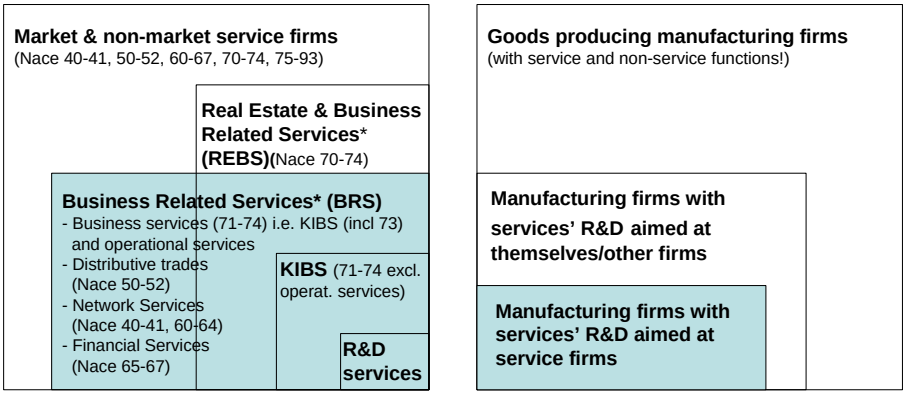
Over the years various categorizations and abbreviations have been used in services' research that are often confusing. As illustrated in Figure 1.1 the proposed seeks to focus on a specific subcategory of services in which services' R&D is believed to be concentrated, namely BR services (or BRS). Within the several categories under business-related services, a particular focus will be devoted to business services and distributive trades. Business services are recognised as drivers of innovation and as innovative linkages between services and goods (Rubalcaba, 1999).

Within the still rather wide category Knowledge-Intensive Business Services (KIBS) require additional attention as they are not only relatively R&D intensive and innovative, but they also facilitate and drive innovation in other service and non-service industries. Within KIBS, the R&D services category is a rather specific case as the core business is performing R&D

[9] They distinguish between the classic R&D pattern (leading to a fordistic variant or a neo-industrial variant), the service professional pattern, the organised strategic innovation pattern, the entrepreneurial pattern, the artisanal pattern and the network pattern.

for (mostly) other industries. Often forgotten are the contributions to services' R&D and innovation made by product-based or hybrid firms. This category is covered by selecting a couple of hybrid firms for our selection of 21 case studies and pay attention to the phenomenon in a dedicated topical paper.

Figure 0.1: Industries that the project focuses on (in blue)



1.7 Approach adopted and outline

RENESER focuses on BR services' R&D and the ways in which the R&D needs of this category of service firms are met in practice. These needs can be met in several ways: through participation in public R&D programmes, through investing in R&D themselves or through benefiting from services R&D performed by others (i.e., through other non BR services, other BR services or non-service firms). We adopted various research methods[10] i.e.:

- Secondary analysis of the available international comparative statistics and national sources on services' R&D and on the actual participation and use by BR services of public R&D programmes. This resulted in a dedicated chapter (chapter 2) giving a 'state of the art' statistical view on various aspects of services R&D as well as various national papers on participation of service firms in national R&D programmes and/or dedicated services R&D programmes. One of the topical papers also analyses extensively the statistics available at EU-level on participation of service firms in EU programmes and the most relevant topics involved. Annex 1 briefly explains the approach adopted for the analysis of the international statistics, including some dedicated tables that EUROSTAT provided
- 21 in-depth case studies. This is the main thrust of the RENESER-project and involved multiple interviews with 21 mostly major European BR-service firms (i.e. including some hybrid firms) using a fixed format for reporting and analysing the outcome. These case studies were mainly used to assess how the R&D strategies of BR service firms and functions are developing and the trade offs that are associated with this process. Key questions here are, e.g.: How are R&D needs in BR services articulated? How is R&D actually organised and how well are BR services

[10] This resulted in various RENESER research products that are only partly integrated in this final report. Annex 5 provides an overview of these deliverables.

linked to external bodies of - both private and public – knowledge? Are the research needs of BR service activities met in public R&D programmes? The selection of cases and approach adopted as well as a synthesis of the outcome are given in chapter 3. Annex 2 presents an overview of the 21 companies interviewed. Annex 3 presents the interview guide used. Annex 4 contains syntheses of the 21 case studies performed.

- The set of four topical papers are a key input for the overall analysis and implications part to be presented in chapters 4-7. The analysis of available statistics, the case studies and the mentioned topical papers are used as building blocks for answering in a more analytical vein the two main question in RENESER i.e.: Is the perceived R&D deficit of individual European BR service firms real? (1); Do service firms benefit enough from public R&D expenditures? (2). These two questions will be dealt with in chapters 4 and 5 respectively. In chapter 6 we mainly deal with the questions whether there is a rationale for a services R&D and innovation policy. In the final chapter (chapter 7) we will mostly deal with the main findings and presenting more systematically the policy, research and statistical implications regarding services R&D.

2 Statistical evidence on R&D and innovation in services

2.1 Introduction & Contextualisation

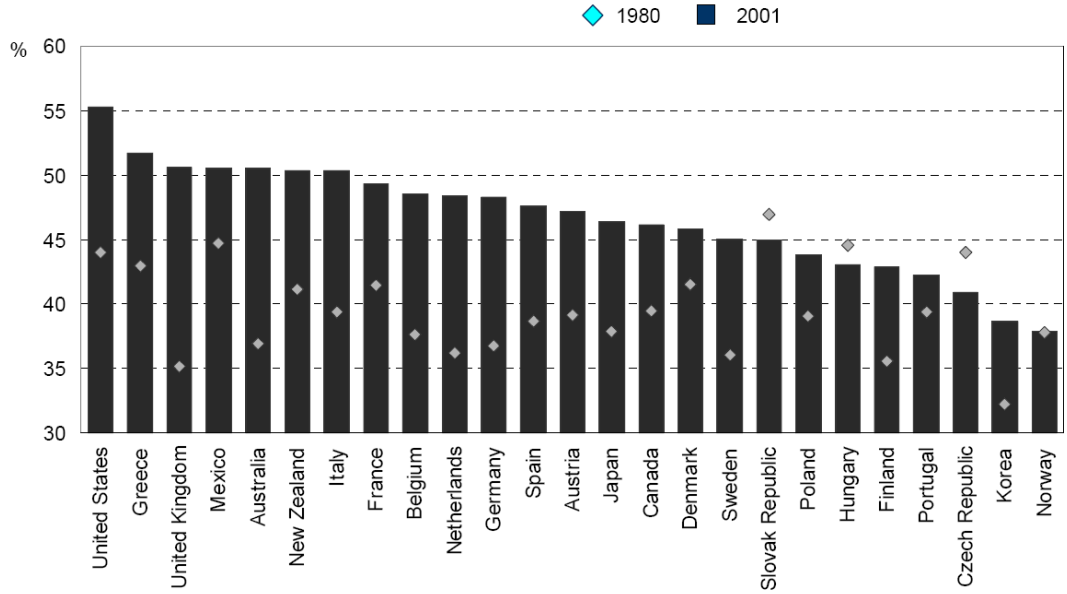
This chapter examines the statistical evidence on R&D and innovation in services, comparing this with manufacturing. Before turning to the evidence on R&D, we begin by contextualising the review by outlining the economic significance of services in the EU (and elsewhere) with respect to value added, employment and productivity. Later in the report we will assess the extent to which innovation and R&D active service have links with the public science base (universities and government research institutes) and the extent to which these firms gain financial and other support for their innovation activities from public bodies, including national governments and the European Union. Annex 1 explains how the research method applied and sources used for the statistical analysis reported in this chapter. When interpreting the data presented in this chapter we have to bear in mind that there are service firms that would or are benefiting from investing in R&D – and their certainly is an untapped potential here – and a vast number of service firms that have limited potential to use R&D still (like in manufacturing). It seems the case that the concentration of R&D performing firms in services is even higher than in manufacturing.

Services are an important part of the economic activity in the EU, US and most OECD economies. Figure 2.1 shows that market services (i.e., those provided by the private sector) now account for between 45% and 55% of economic activity, and moreover that in all but a few countries (Hungary, Norway, and the Czech and Slovak Republics) this share has grown substantially since 1980. In the UK, for example, market services accounted for 35% of GDP in 1980, but now account for over half of GDP. In Germany and the Netherlands market services accounted for about 36% of GDP in 1980; this share has now risen to around 46%. Overall, between 1990 and 2001 market services contributed approximately two-thirds of the increase in value added in OECD economies.

Definition: Market Services are service activities which are predominantly provided by private sector firms or organizations. These include retail and wholesale trades, transport and communications, financial services, and business services. By contrast, non-market services (which are also known as social or public services) are those where all or most of provision is by the public sector. Examples of non-market services include education and health services.

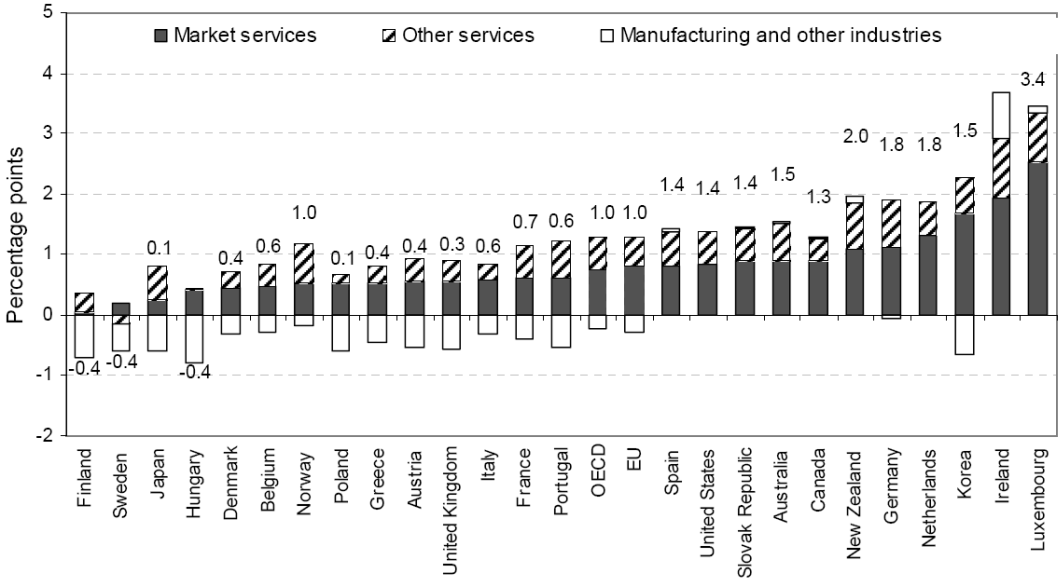
As the role of services is growing steadily in terms of value added (and employment), it follows that they are also the source of most new employment in the European Union and other advanced economies. Figure 2.2 shows the contribution between 1990 and 2002 to aggregate employment growth of market services, other (social) services, and manufacturing and other industries (i.e., mainly construction). It is clear that market and other (social) services are the main areas of employment growth, whereas in almost all the countries shown manufacturing and other industries have reduced their employment or made only a minor contribution to aggregate employment growth. Only in Ireland has manufacturing made a substantial contribution to aggregate employment growth, but even there its contribution is smaller than both market and other (social) services.

Figure 2.1: Share of the market services in total value added, 1980 and 2001



Source: OECD (2005) Enhancing the performance of the services sector. October 2005 Paris. (p. 6) / OECD STI scoreboard, 2003

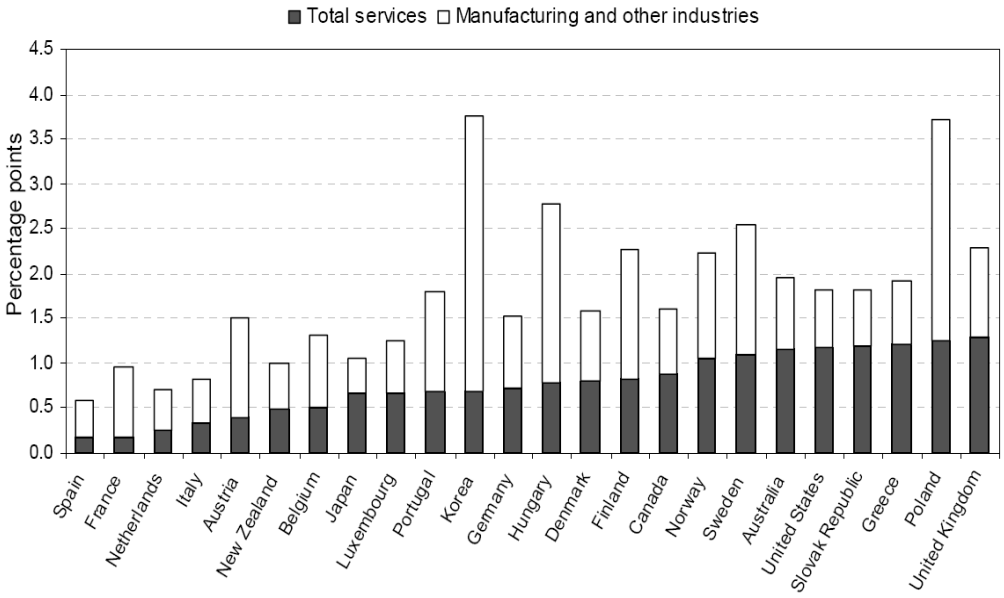
Figure 2.2: Contribution to aggregate employment growth, 1990-2002. Average annual contribution (percentage points)



Notes: 1 or most recent year available. Germany: 1992-2001, West Germany: 1980-1990. The sum of the contributions per industry may be slightly different from the aggregate values.

Source: OECD (2005) Enhancing the performance of the services sector. Paris. p. 45/ OECD STAN Database, 2004

Figure 2.3: Contribution of the services sector to productivity growth, 1990-2002. Contribution to growth of value added per person employed (percentage points)



Source: OECD (2005) Enhancing the performance of the services sector, OECD, Paris. (p. 12).

Services are also an important source of productivity growth, as figure 2.3 shows. It is also the case that in many service sectors productivity growth has not been as rapid as in manufacturing, meaning there is a productivity gap between some services and manufacturing. There is also a gap between the (higher) productivity of some services in the US and (lower) productivity of the same services in the EU. It is notable that the bulk of labour productivity growth in many if not all advanced economies over the past decade is due to the growing use of productivity-enhancing technologies, such as information and communication technology (ICT) in combination with intra- and inter-organizational changes.

Summary

Overall, and in summary, it is evident that:

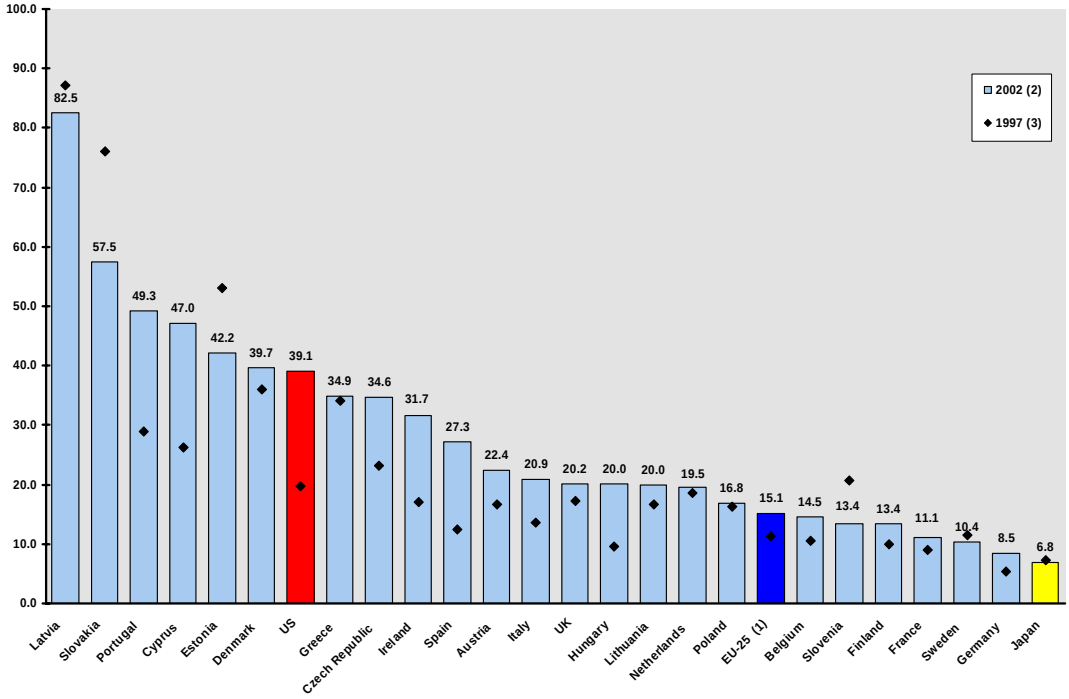
- Services play an important role in advanced economies such as the EU and US. Market services alone account for between 45% and 55% of *total* value added in most OECD countries.
- Services are the main growth sector of advanced economies. Market services alone increased their contribution to total value added by around 10 percentage points between 1980 and 2001.
- Services are especially important in terms of employment and employment growth. Manufacturing is contracting in most advanced economies, whilst in many others it is making a negligible contribution to employment growth. In the EU and US, the vast majority of new jobs are in services.

- As a large part of the economy, productivity growth in services is important for total economic growth. There is some evidence that productivity growth in services lags behind that in manufacturing. Moreover, the productivity of many European services lags behind the productivity of similar services in the United States.
- In the future services are likely to be increasingly traded, both within the EU and beyond. Given the size of the services sector it is vital that Europe enhances the competitiveness of its service sectors. Innovation and R&D, conducted both within firms and across 'systems of innovation' will be important to enhancing competitiveness.

2.2 R&D in Services: An Overview

Despite dominating economic activity, in most services account for relatively small shares of officially recorded business expenditures on R&D (BERD). Figure 2.4 shows that in the EU-25 services account for only about 15% of BERD, whereas in the US services account for almost 40%. Only in Latvia and Slovakia do services account for more than half of business expenditure on R&D. Services' share of business expenditures on R&D is rising however. In Europe, services' share of BERD was 11.5% in 1997, whilst in the US service's share was about 20%. These official data indicate that not only do services undertake a larger share of R&D in the US than in Europe, but that their share is also growing more rapidly – roughly doubling in the US in the five years from 1997 to 2002, whilst growing by only around 30% in Europe over the same period.

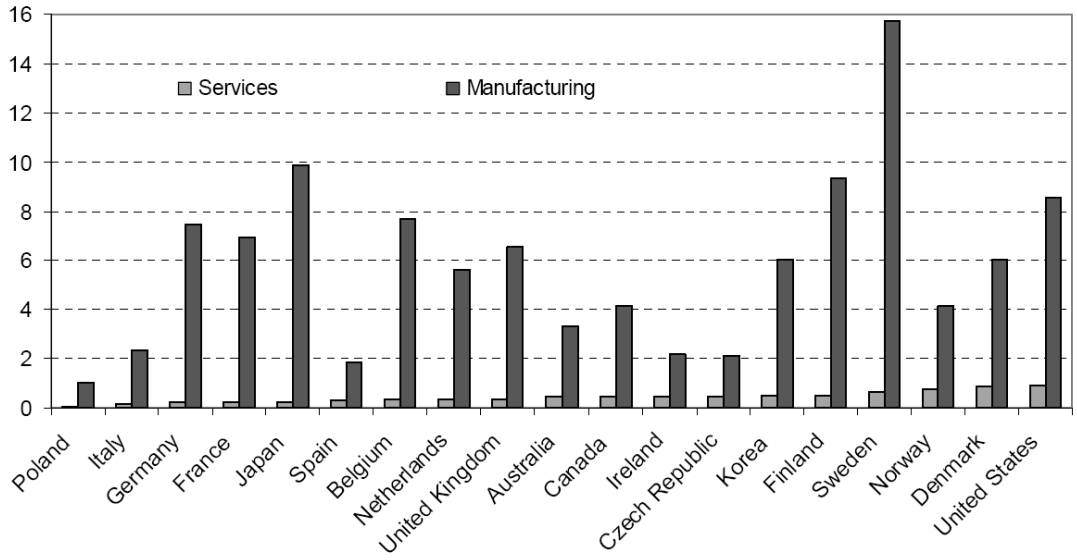
Figure 2.4: Share of BERD performed in the services sector 1997 and 2002



Source: EU (2005) Key figures on Science, Technology and Innovation. Towards a European knowledge area, 19/07/05, European Commission DG Research, p. 37

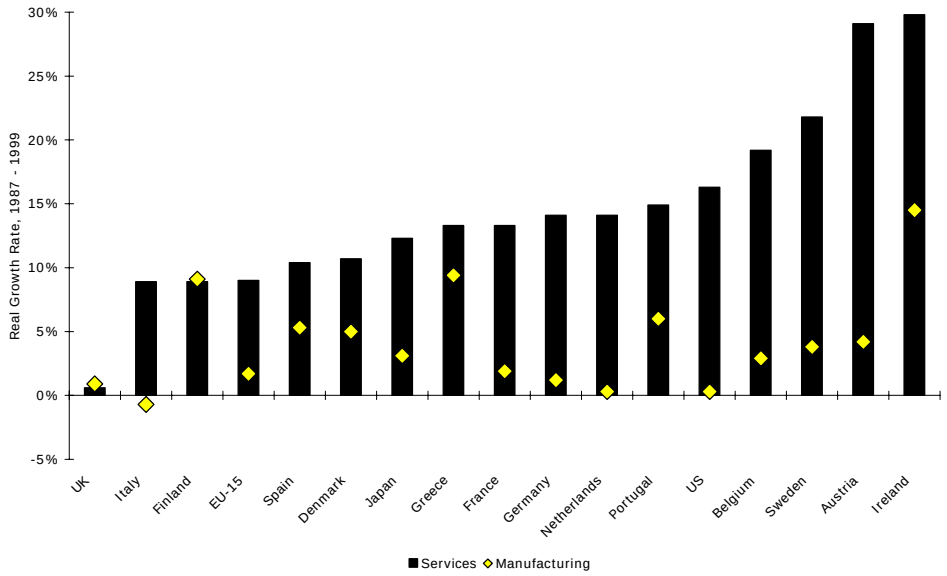
As services constitute the majority of the economy, but conduct only a small share of R&D, it follows that the intensity of R&D activities (i.e., R&D as a share of value added) in services tends to be substantially lower than the intensity of R&D activities in manufacturing. Figure 2.5 shows this is the case. For a variety of countries, the figure shows striking differences between the average R&D intensity of services (which even in the US only reach around 0.5%) and manufacturing, with the latter typically achieving an R&D intensity of at least 2%, but frequently 4% and above. It is clear that given the economic weight of the service sector in the European economy, if the EU is to achieve its Lisbon agenda target of increasing R&D as a proportion of value added to approach 3% by 2010 then raising the R&D intensity of European service sectors is of fundamental importance.

Figure 2.5: R&D intensity of the services and the manufacturing sector, 2001. Total BERD as a percentage of value added per sector



The importance of looking to services as the source of growth of R&D in Europe is further supported by evidence on the growth of R&D activities in services and manufacturing. As Figure 2.6 shows, services are increasingly investing in R&D, albeit typically from a very small base. By contrast, between 1987 and 1999 manufacturing R&D showed little growth in the majority of European countries and the US.

Figure 2.6: Real Growth Rates of Business Expenditure in Services and Manufacturing on R&D as a share of GDP, 1987-1999 in Various Countries



Source: Third European Report on Science and Technology Indicators, 2003, Figure 3.2.9

Summary

Overall, and in summary, it is evident that, according to official statistics:

- Relative to their economic importance, services account for a small share of R&D. Services' share of business expenditure on R&D is lower in the EU (15%) than in the US (39%).
- It follows that the average intensity of R&D activities in services tend to be much lower in services than in manufacturing. In manufacturing, expenditures on R&D typically equate to at least 2% of value added; in services this share does not exceed 0.5% of value added.
- In contrast to R&D in manufacturing which has shown little growth in recent years, R&D in services is growing rapidly in most countries (albeit from a small base).[11] In the EU-15 services R&D grew by around 9% per annum in the 1987-1999 period, compared with only about 1% for manufacturing R&D. However, over the same period services R&D in the US grew by over 15%, thus widening the gap between the share of R&D activities undertaken in the service sector in Europe and the US.
- Given the economic weight of services, their continued growth whilst manufacturing is at best stagnant, coupled with their low but increasing engagement in R&D, it follows that encouraging services to invest more heavily in R&D is the key to Europe achieving its Lisbon agenda objective that total investment in R&D approach 3% of GDP by 2010.

[11] A portion of the rapid growth in service-sector R&D is a statistical artefact reflecting better measurement of R&D in the service sector and a possible reclassification of some R&D-intensive firms from manufacturing to services (as their service activities have expanded).

2.3 R&D in Services: Sectors Differ

Until now we have analysed services and manufacturing as aggregate sectors. This masks substantial variation within both these grand sectors, and here we expose some of the variation within services regarding the extent to which service firms engage in R&D.

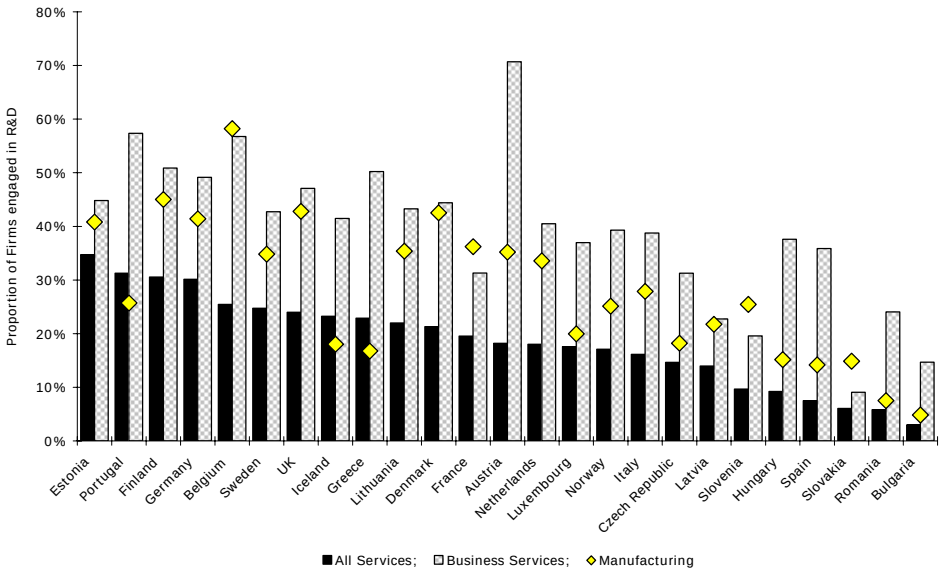
The data for figure 2.7 below has been derived by Eurostat from the results of the 3rd European Community Innovation Surveys.[12] This clearly shows that in most countries manufacturing firms are more likely than service firms to engage in R&D (on a continuous or occasional basis). The only exceptions are Portugal, Iceland and Greece. However, within services the business services included in the survey (see the definition box below) were usually more likely than manufacturers to engage in R&D; the only exceptions being France, Belgium, Slovenia and Slovakia. It follows that if these business services were excluded from the 'all services' category the proportion of services engaged in R&D would be lower, with a wider gap between manufacturing and service firms.

Definition – Business Services: 'Other business services' are market services primarily oriented to serving other businesses (rather than households) and not classified as trade and distribution, transport and communications or financial intermediation. This includes activities like advertising, legal and accountancy services and security services. However, the European Community Innovation Surveys (CIS) only included a selection of Business Services in sampling frame. These where computer services, R&D services, engineering consultancy and related activities, and technical testing and analysis. These are all technically oriented services, and are unlikely to be representative of all business services in their patterns of innovation, conduct of R&D and interactions with the science base. Care should be taken, therefore, when considering the results arising from these analyses. Also notable is that All Services refers to all service activities included in the surveys, which apart from the above mentioned selection of business services also included wholesale and commission trade, transport and communications, and financial intermediation. Many market services such as hotels, restaurants and retailing are not included, and all non-market (or public) services are also excluded. Again, this means that considerable care should be taken in assessing the results of these surveys, and in making comparisons with manufacturing and other activities. Finally, although most of the comparisons made in this document are with manufacturing, in a few tables or figures comparisons are made with 'industry'. Industry is the combination of manufacturing and mining and quarrying and the utilities (electricity, gas and water supply).

In fact, in most countries, two service sectors: 'business services' and 'post and telecommunications' account for more than three-quarters of officially recorded R&D undertaken by service firms, and indeed within these broad sectors the sub-sectors of 'computer and related services', 'R&D services' and 'telecommunications' account for almost all of this R&D. Indeed, these three sub-sectors, and computer and related services in particular, account for most of the growth in R&D intensity in all services over the last decade (see figure 2.8). In Germany, Korea, Netherlands and Portugal, R&D intensity in the computer and related services industry has increased by more than 25% per annum in recent years. This highlights the fact that service-sector R&D varies considerably across sub-sectors of activity (as is also the case in manufacturing).

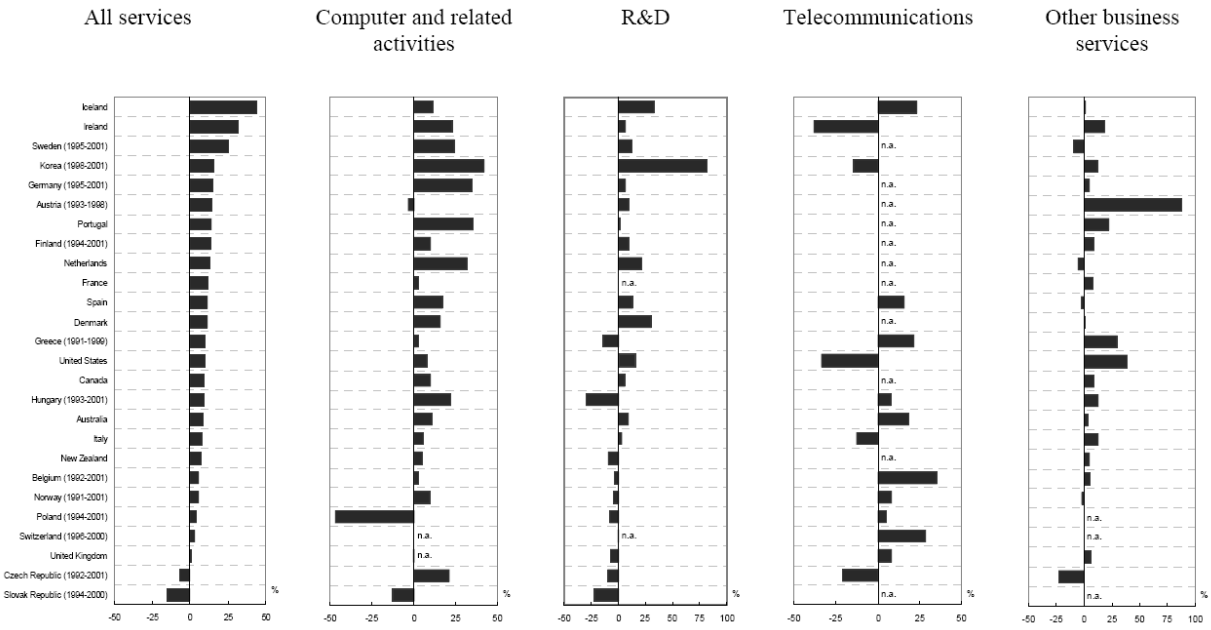
[12] In the Eurostat analysis of the third European Community Innovation Survey data (CIS-3) there were no EU averages included because of a lack of data. In addition, there were questions about how to derive those averages: if we took a conventional approach and weighted by country then Germany would have the greatest weight even though Germany has a relatively small sample of CIS respondents and is amongst the countries with the lowest response rates. In short, an EU average would only be misleading at this stage, so they were not included in these figures.

Figure 2.7: Proportion of All Service, Business Service and Manufacturing Firms engaged in R&D between 1998 and 2000 according to the 3rd European Community Innovation Surveys



Source: Eurostat analysis of the third European Community Innovation Survey data (CIS-3)

Figure 2.8: Growth of R&D intensity, services sector, 1990-2001, Average annual growth rates (%)



Source: OECD (2005) Enhancing the performance of the services sector. Revised and extended version, October 2005 Paris, p.22. / OECD ANBERD and STAN databases, 2004.

Box 2.1 derived from UNCTAD data on transnational corporations and the Internationalization of R&D describes in somewhat more detail R&D intensities in general as well as R&D spending by what is coined non-manufacturing activities. Remarkable – apart from the fact that these figures concern rough estimates – are the R&D spending associated with trade and information (both higher than computer systems design and related services) and the large share of scientific R&D services.

Summary

Overall, and in summary, it is evident that:

- The propensity to engage in R&D varies widely between individual service sectors. Services with high levels of technological opportunity, such as computer services, telecommunications, and R&D and engineering services are significantly more likely to engage in R&D than other services. Transport and distribution services (including retail) have a low propensity to engage in R&D.
- The vast majority of officially recorded R&D undertaken by service sector firms is undertaken by firms in three sub-sectors: computer and related services, telecommunications, and R&D services.

Box 2.1: Services sector R&D in the United States (UNCTAD (2005), p. 110)

Box III.3. Services sector R&D in the United States

Service enterprises in the United States sharply increased their R&D spending and their share of total industrial R&D after the mid-1980s. Before 1983, service industries accounted for less than 5% of total industrial R&D; by 2002, their share reached 43%. The total value of R&D by services was $82 billion compared to $109 billion for manufacturing in 2002.

The amount of R&D by firms in service activities varied greatly (box table III.3.1). The leading performers were trade, scientific R&D services, software and computer systems design. With a combined R&D of $63 billion, they accounted for 77% of R&D by service firms.

The R&D intensity of service firms (R&D as a percentage of sales) is higher than that for manufacturing firms, though it also varies greatly by activity (box table III.3.2).

However, the classification of firms under service categories has to be treated with care. Companies are classified under various service activities on the basis of payroll, and the classification may be misleading as a result. This is particularly true of "trade". Thus, firms with a high payroll in sales and marketing are classified under "trade", and may include manufacturers with high marketing payrolls or diversified industrial conglomerates. One example of misclassification (noted by NSF) is that over $1 billion of biotech R&D in 2001 appears to have been performed by trading companies, when it is likely to have been performed by manufacturing companies.

Box table III.3.1. R&D spending by non-manufacturing activities in the United States, 2002
(Millions of dollars)

Total non-manufacturing	81 824
Mining, extraction and support activities	app. 700
Utilities	app. 100
Construction	164
Trade	app. 25 000
Information	17 870
Transportation and warehousing	app. 300
Newspapers, periodicals, books and databases	614
Software	12 927
Broadcasting and telecommunications	app. 1 600
Other information services	app. 2 600
Finance, insurance and real estate	1 903
Architecture, engineering, related services	4 159
Computer systems design, related services	11 983
Scientific R&D services	13 034
Other professional and scientific services	1 182
Management of companies and enterprises	148
Health-care services	app. 4 200
Other	app. 900

Source: United States, NSF (forthcoming), tables A-2, A-3.
Note: Approximate (app.) figures are based on R&D funded by industry; data on federal funding of R&D are suppressed for confidentiality reasons, so that total R&D spending is also suppressed.

Box table III.3.2. R&D intensity: company and other (non-federal) R&D funds as % of net sales in R&D-performing firms

	2001	2002
All industries	3.8	3.6
Manufacturing	3.6	3.2
Non-manufacturing	4.0	4.1
Scientific R&D services	36.5	17.6
Software	19.3	21.4
Computer systems design, related services	16.5	14.3
Management of companies	7.8	7.6
Trade	6.2	5.0
Architectural, engineering, related services	5.2	5.3
Health-care services	4.1	15.1
Newspapers, periodicals, books, databases	2.7	2.8
Transportation and warehousing	2.4	0.5
Construction	1.4	0.6
Mining, extraction and support	1.3	3.2
Finance, insurance and real estate	0.7	0.6
Broadcasting and telecommunications	0.5	0.7
Information	4.4	4.0

Source: United States, NSF (forthcoming), table A-27.

Firms in software and computer systems design and related services jointly spent $21 billion on R&D in 2002, raising their share of total United States company-funded R&D from 4% in 1987 to 12% in 2002.

Scientific R&D services, the leaders in R&D intensity in 2001, are provided by companies that perform R&D for other firms on a contractual basis, mainly in manufacturing. R&D by these firms more than doubled during 1997-2001, showing both the rising pace of innovation and the growing willingness of manufacturers to outsource R&D previously kept in-house (Jankowski, 2001).

Health-care services are tightly linked to the high-technology pharmaceutical industry. Firms in these services have traditionally done relatively little R&D, but there was a sharp increase in 2002. The financial services and insurance industry, along with broadcasting and telecommunications, does very little. However, formal R&D may not be the best way to measure innovation in these industries, as they are constantly designing and introducing new products and processes.

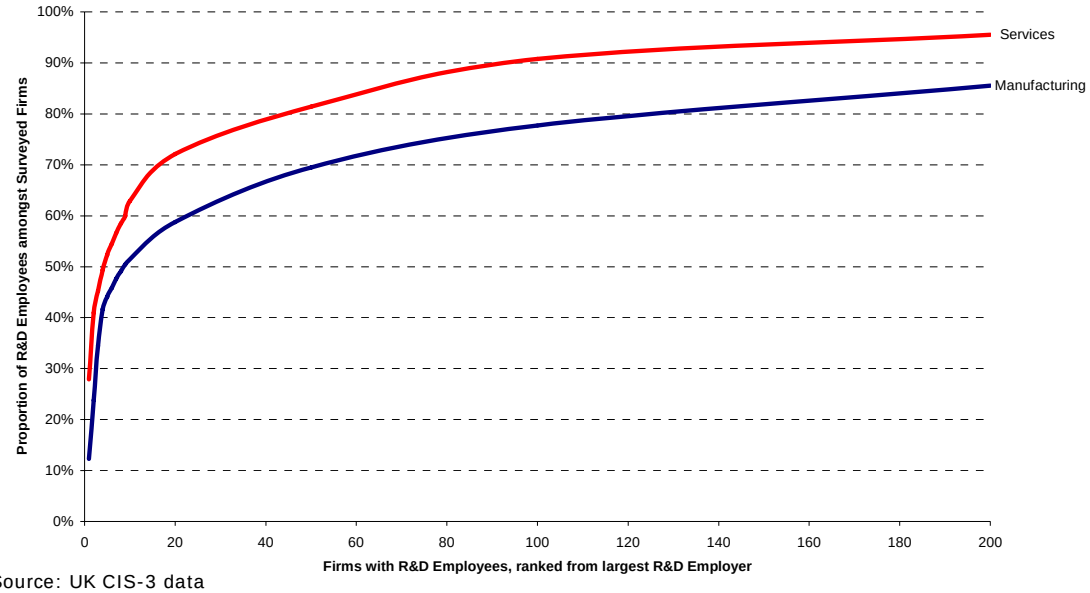
Source: UNCTAD, based on information provided by NSF.

2.4 The Concentration of R&D

R&D activities are highly concentrated, in a few countries, in a few industrial sectors (including service sectors), and even in a few firms. Ten countries (the US, Japan, Germany, France, the UK, Korea, China, Canada, Sweden, and Italy) account for almost 90% of worldwide business expenditures on R&D (and 87% of all R&D spending). Moreover, this concentration of R&D is increasing, not decreasing. The US alone accounts for 43% of worldwide expenditures on business R&D (and over 40% of all R&D) (UNCTAD, 2005, p.105).

R&D is also highly concentrated in a relatively small number of firms. Figure 2.9 below shows the concentration of R&D employment in manufacturing and service firms that responded to the UK innovation survey of 2001. The 20 manufacturing firms with the largest number of R&D employees accounted for 57% of the total number of R&D workers among the surveyed manufacturers. In services, R&D employment was even more concentrated: the 20 service firms with the largest number of R&D employees accounted for over 70% of all R&D employees amongst the surveyed (service) firms.

Figure 2.9: The concentration of R&D employment in Manufacturing and Services

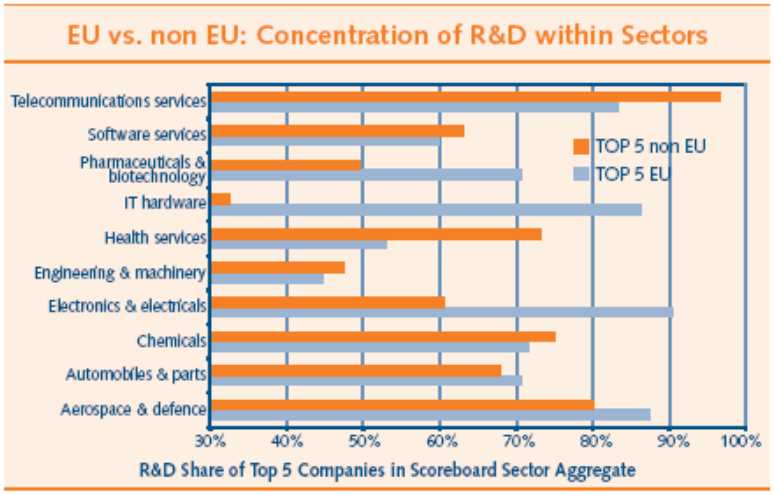


Source: UK CIS-3 data

This concentration of R&D in a few firms is found in most industrial sectors, although the degree of concentration can vary. Figure 2.10 shows proportion of R&D accounted for by the five largest firms by R&D expenditure in a variety sectors in the EU and non-EU (i.e., mainly US and Japan). Telecommunications services shows a very high degree of concentration, with the five largest firms accounting for over 80% of R&D spending in the EU, and over 90% in the non-EU. By contrast the concentration is much lower in both the EU and non-EU in engineering and machinery. In most sectors the patterns of concentration are similar between the EU and non-EU, although in pharmaceuticals and biotechnology, IT hardware, and electronics and electricals the EU shows far more concentration than the non-EU, whilst the reverse is the case in health services. In the

case of health, the main reason lies in the lack of major (private sector) R&D investors among EU companies operating in this sector.

Figure 2.10: Shares of top 5 companies in total sector R&D investment of companies listed in The EU 2004 Industrial R&D Investment Scoreboard registered in EU vs. non-EU regions – data for 2003 (%)

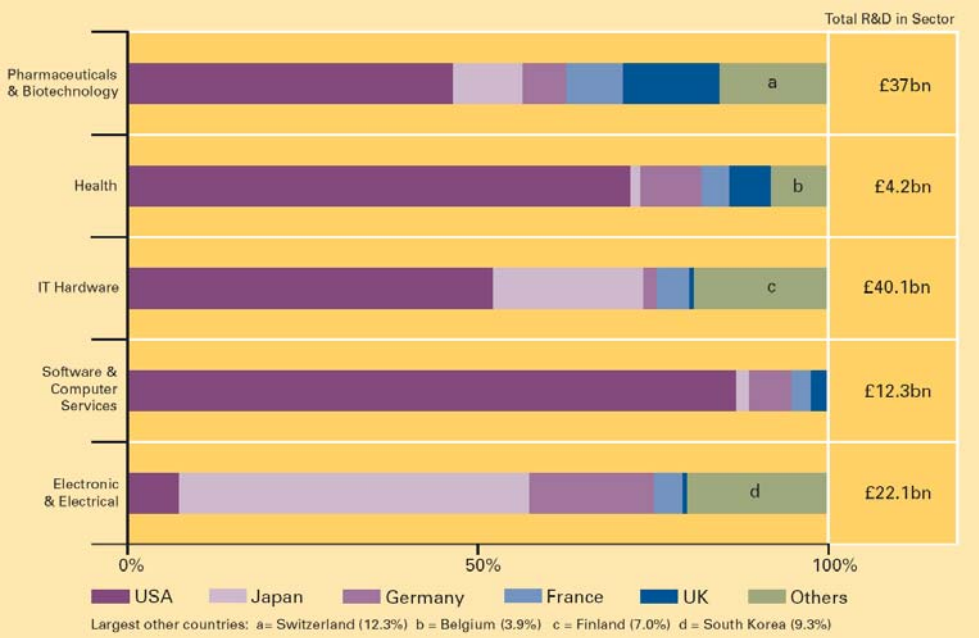


Source: EU (2004) R&D investment scoreboard. p.55

Figure 2.11 shows the distribution of R&D in a variety of sectors by the country of origin of the companies that engaged in R&D. Bearing in mind that this distribution is largely determined by the country of origin of the largest R&D players, the figure basically shows that US is home to most of the largest R&D players in four of these five sectors, including software and computer services and health services (whilst Japan is home to the largest players in electronics and electricals). In other words, a high R&D intensity in any country or sector, including a service sector, is largely the result of having one or more 'big players' in that country or sector as these big players drive the average R&D performance of sectors or countries tremendously – just think of Sweden without Ericsson, or Finland without Nokia. It follows, therefore, that Europe's low R&D intensity in services relative to that in the United States is largely explained by the presence in the US of 'big players' in health services and in computer and software services.

This observation (the concentration of R&D in large firms in the US) is one of the reasons to bias our sample of case studies towards larger firms. However, there certainly is a need in future research to look more detailed look into R&D as performed in service SMEs as these are not necessarily making the trade offs as the firms in our sample. Time, budget and importantly the more implicit ways in which R&D is organized is a relevant factor. Quite a number of service SMEs are investing considerably in using new technologies, new services and products. The technological and moreover non technological expenditures are considerable, but remain largely hidden. The underreporting of R&D by SME's in the official statistics – including sample frameworks of R&D and innovation surveys - is certainly one of the topic that requires further research in the near future.

Figure 2.11: Proportions of R&D by country for the 5 top R&D sectors



Source: DTI – 2004 R&D scoreboard, p.60

However, this also raises an important issue about how R&D is accounted for and attributed to different sectors. Typically all of a company's R&D will be assigned to the sector of activity that is the main activity of that company. Suppose, therefore, that there is a company that both manufactures electronic equipment and produces computer software – but 55% of its value added is derived from electronic equipment. All of this firm's R&D will typically be assigned to electronics, even if in actual fact it is doing the majority of its R&D in computer software. Now suppose over time the computer software side of this company grows faster than the electronics, and at a certain point it generates over 50% of its value added from the computer software. At this point the firm will be reclassified as a computer service firm, even though a large part of its activities and R&D spend may still relate to manufacturing. When very large companies make this transition it can have a dramatic effect on the apparent distribution of R&D activities between manufacturing and services (or in this case more specifically between electronics manufacturing and computer services). Although this may seem fanciful, IBM was reclassified from being a manufacturer to a service firm in the 1990s.[13]

[13] In some documents this reclassification has still to occur. In the UK Government's innovation scoreboard e.g. IBM still appears as an IT hardware firm, whereas it derives most of its revenues from services.

Summary

Overall, and in summary:

- R&D is highly concentrated geographically, by sector and in a few giant firms. The presence or absence of these giant firms can have an enormous impact on the R&D intensity of their host country or sector – just think about Finland without Nokia or Sweden without Ericsson.
- Because of this high degree of concentration, care should be taken with interpreting the statistics, particularly as all the R&D of a company will typically be assigned to that company's main activity, even if it is undertaking a large proportion of its R&D in quite different activities. This means that arguably a considerable amount of R&D is being misallocated – big 'manufacturing companies' are increasingly undertaking R&D efforts in services, but all of this R&D is still being attributed to manufacturing, rather than services.

2.5 R&D and Innovation in Services

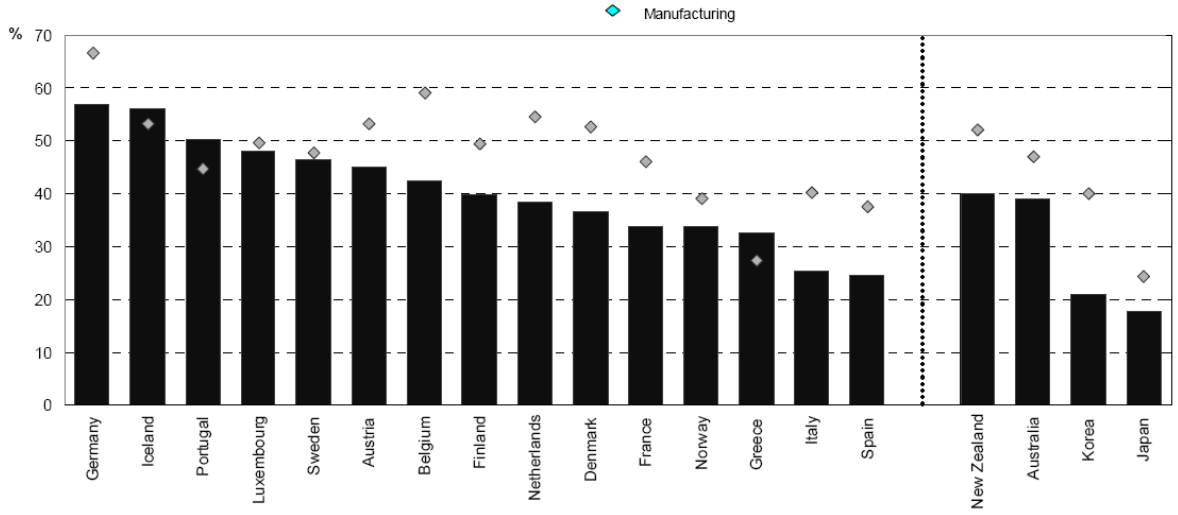
Innovation is of course much broader than R&D, although some innovation depends directly on R&D efforts, and other innovation depends indirectly on R&D. In this section we examine the extent to which services engage in innovation, and the extent that they engage in R&D. In so doing, we examine whether innovation in services is less directly dependent on R&D than innovation in manufacturing.

Innovation surveys indicate that whilst service-sector firms are innovative, overall they tend to be less likely than manufacturing firms to engage in innovative activities Figure 2.12 shows in most that European and other countries, service firms are less likely to have innovative activities than are manufacturers (Portugal, Iceland and Greece are exceptions). It is however notable that the gap in innovative intensities between manufacturing and service firms tends to be small, and is certainly considerably smaller than the gap between the R&D intensities of manufacturing and service firms. This suggests services are less likely to use a formal R&D in their innovation activities.

Figure 2.12 is based on all service firms (amongst those activities included in the Community Innovation Surveys) and masks considerable variation within services. Disaggregating services in to various sub-sectors (see figure 2.13) shows that financial and (technical) business services are actually more likely to engage in innovation activities than are manufacturers. Meanwhile trade services and transport and communications have strikingly low innovation intensities. These two less innovative service sub-sectors account for 60% to 80% of the population of service-sector firms in the CIS3 surveys and therefore contribute heavily to the service sector's lower overall average innovation intensities.

The Community Innovation Surveys also asked the firms about the activities they spend money on in the course of their innovation activities. Figure 2.14 shows that both manufacturing and services were most likely to spend money on the acquisition of machinery and equipment, training and internal R&D, although the order of these varied between these two sectors. Overall, manufacturers were more likely to have invested in machinery and equipment, intramural and extra-mural R&D and design and related activities, whilst services were more likely to have invested in training, the market introduction of innovations and the acquisition of knowledge (e.g., through licensing in).

Figure 2.12: Innovative density in the service sector and the manufacturing sector. Share of innovative firms in each sector as a % of firms in each sector



Note: Results of CIS3 and the innovation surveys in other countries are not fully comparable. Time period is 1999-2001 for Japan, 2000-2002 for New Zealand, 2001-2002 for Korea, 2001-2003 for Australia; 1998-2000 for all other countries.

Source: OECD (2005) Enhancing the performance of the services sector, OECD, Paris. p.136 / OECD based on data from Eurostat, CIS3 Survey, 2004, and innovation surveys of Australia, Japan, Korea and New Zealand.

Figure 2.13: Average innovative density among EU firms, by industry, 1998-2000

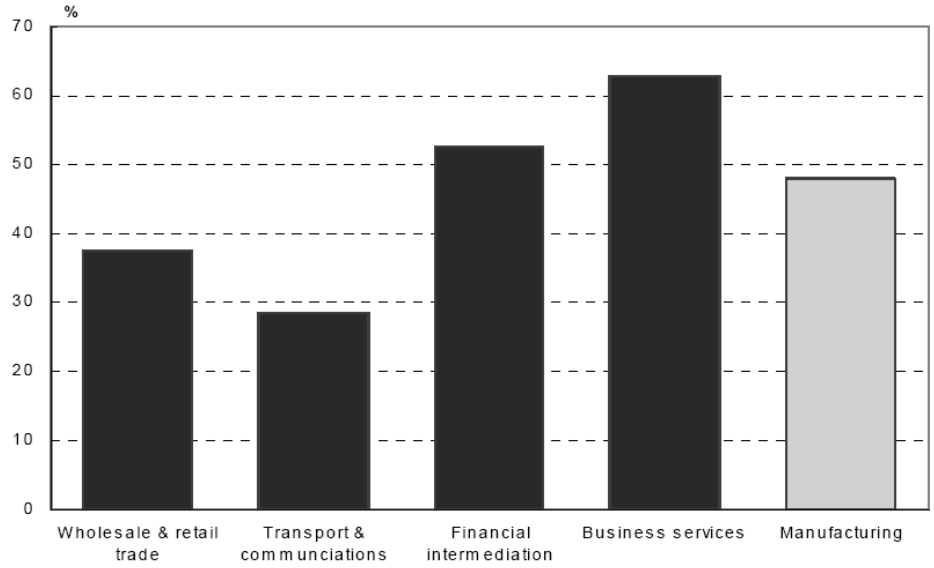
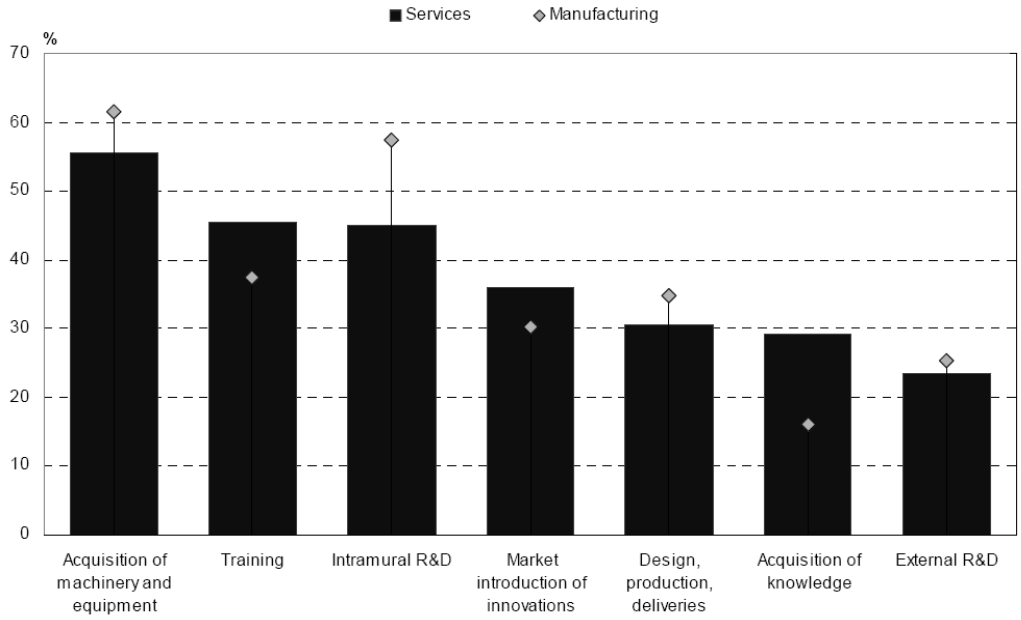


Figure 2.14: Share of innovative firms by activity, 2000. As a % of all innovative firms, country average from CIS countries reviewed.



Source: OECD (2005) Enhancing the performance of the services sector, OECD, Paris. p.142 / Eurostat CIS3 Survey, 2004.

Summary

Overall, and in summary:

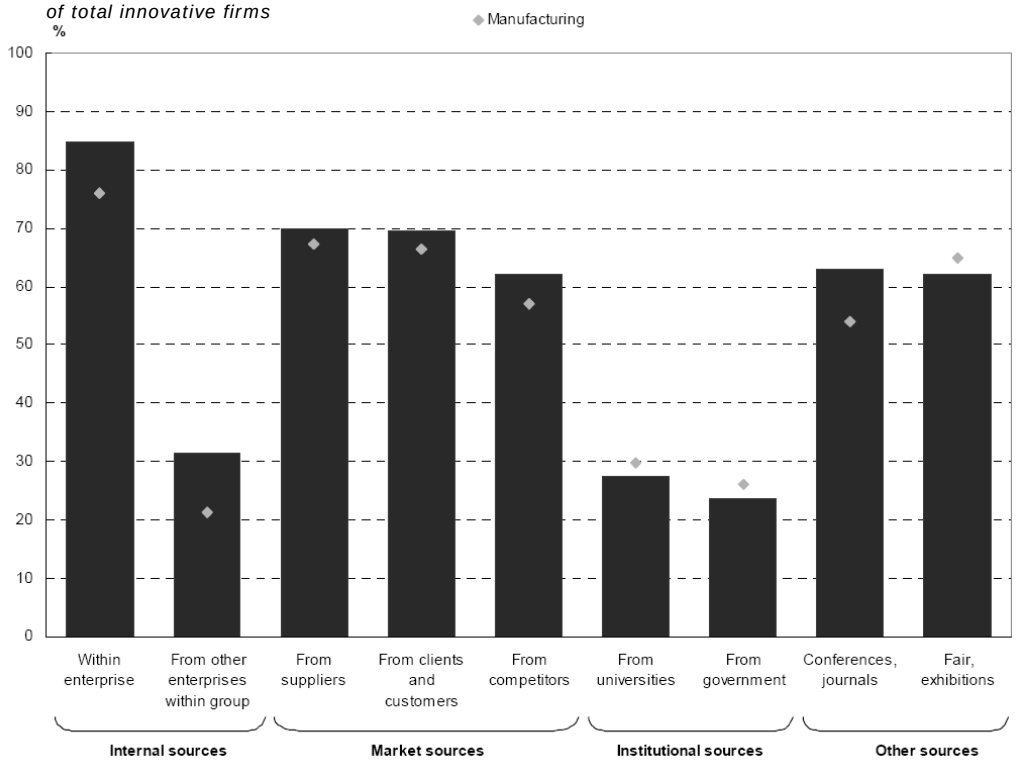
- Surveys usually find services to be less active in innovation than their manufacturing counterparts, although the gap is often small. This may be due to a number of factors, including greater exposure to international trade and competition in the manufacturing sectors, and measurement error – the existing measures of innovation have been developed with manufacturing primarily in mind and therefore forms of innovation that are more prominent in services may be being overlooked.
- There is considerable variety in the innovation intensities of sub-sectors within the wider services sector. Financial services and certain technical business services (such as computer services and engineering consultancy services) are found to be more likely to innovate than are manufacturers, whilst trade services and distribution and communications services have low rates of innovation.
- Overall, service firms are less likely to engage directly in R&D as part of their innovation activities than are manufacturing firms.
- Some service firms do however engage in formal R&D, and these firms can be found in all sub-sectors amongst services. When service firms do engage in formal R&D activities this typically accounts for a sizable proportion of their total investment in innovation activities.
- Many services may be engaging in R&D activities but failing to recognize these activities as R&D, as they do not have R&D or innovation departments. These investments are therefore being missed by surveys of innovation and R&D.

2.6 Connecting with the Science Base

This section explores the extent to which service firms have links to the science base, which is comprised of universities and government research institutes. It is sometimes argued that services are less likely to gain access to these sources of information or knowledge in the course of their innovation activities.

The European Community Innovation Surveys ask firms which sources of information they used in their innovation activities. Figure 2.15 below shows that overall manufacturing and service firms use similar sources of information for their innovation activities. Both manufacturing and service firms are most likely to draw on sources of information internal to the firm (which may include R&D), followed by 'market sources' (customers, suppliers and competitors) and 'other sources' (conferences and journals, fairs and exhibitions). Universities and government research institutes were the least widely used sources of information by both manufacturers and services firms, although they were slightly less widely used by services than by manufacturing firms. Also interesting is that service firms are more likely to draw on internal sources of knowledge, even though as we have seen they are less likely to undertake R&D.

Figure 2.15: Sources of information used by innovative firms in the service sector, 1998-2000, as a % of total innovative firms



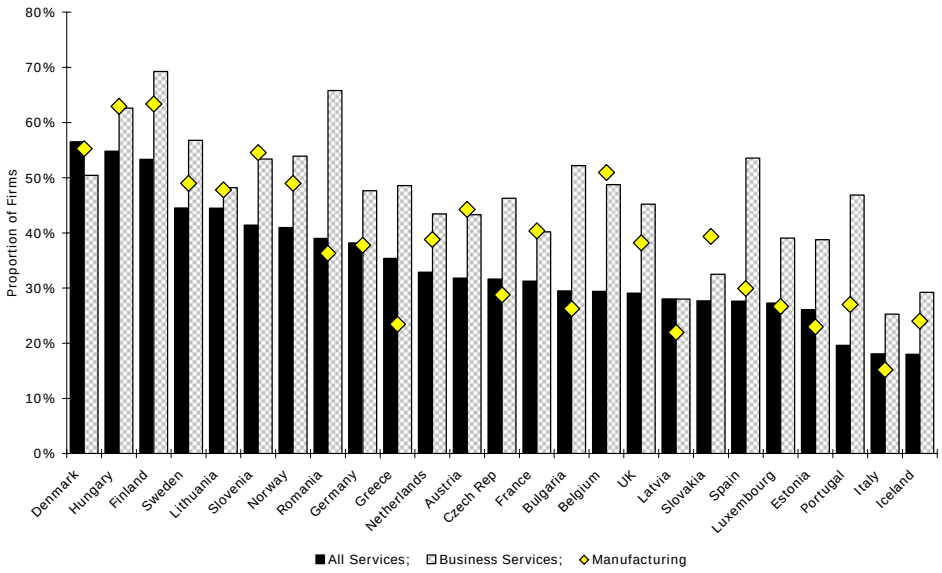
Note: Iceland and Sweden are excluded due to limitations on the quality of the data.

Source: OECD (2005) Enhancing the performance of the services sector, OECD, Paris. p.149 / Eurostat CIS3 Survey 2004.

Further analysis shows that the proportion of innovation active firms that sourced information from universities and/or government research institutes varied widely between countries – from about 55% of service firms in Denmark to less than 20% in Italy and

Iceland (Figure 2.16). In most countries, but certainly not all, the proportion of service firms drawing information from the science base was lower than the corresponding proportion of manufacturers. However, in several countries the proportions were very similar, and in a few countries (Greece and Latvia) services were more likely to draw from the public science base than were manufacturers. Thirdly, in almost all countries the proportion of business service firms that drew on the public science base was significantly higher than the proportion of all service firms, suggesting that links with the science base are stronger for firms with a technical orientation to their innovation activities.

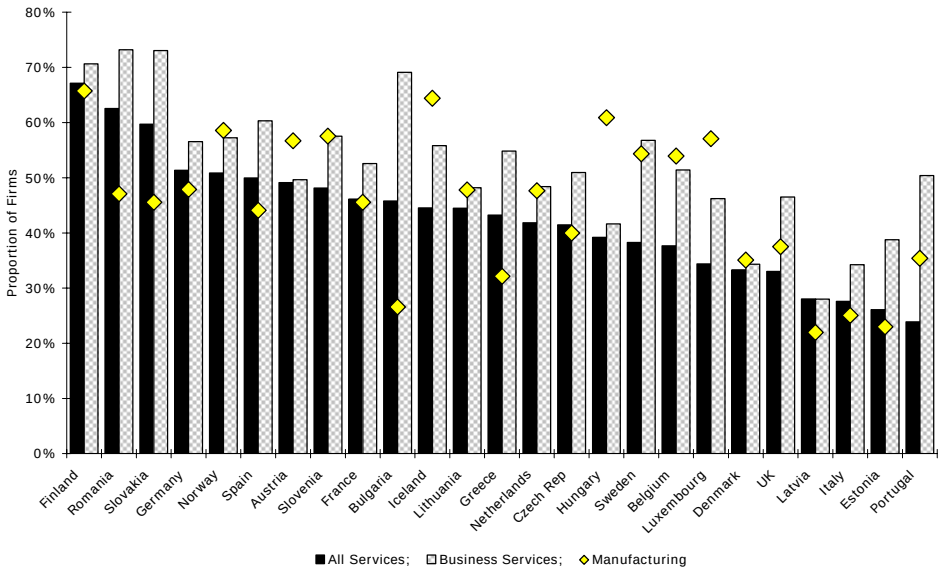
Figure 2.16: The proportion of innovation active firms sourcing information from universities and/or government research institutes



Source: Eurostat (2006) Community Innovation Survey 3 1998-2000.

Similar results arise when the analysis is restricted to firms active in research and development rather than those active in innovation (Figure 2.17). Again, there is great variation between countries in the extent that the science base is drawn upon for innovation. In about half the countries manufacturers are more likely to access the science base, but in others (such as Greece) the opposite is the case. In almost all countries business services are more likely to have these links than are services in general. Lastly, it is notable that in the great majority of cases firms engaged in R&D are more likely than innovating firms to have draw on the science base in the course of their innovation activities. This implies that the conduct of R&D enhances firms' abilities to make links with the science base and/or make use of the information generated by the science base.

Figure 2.17: The proportion of firms active in R&D sourcing information from universities and/or government research institutes

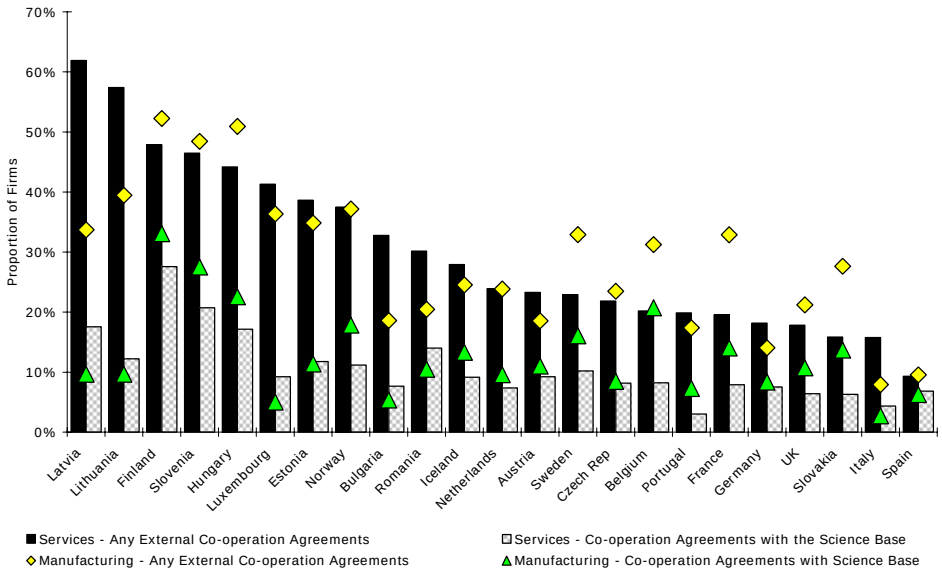


Source: Eurostat (2006) Community Innovation Survey 3 1998-2000.

Turning to co-operation arrangements for innovation, Figure 2.18 shows the proportion of innovation active, manufacturing and service firms with one or more of these arrangements with any type of external partner (e.g., customer, supplier, competitors, etc.), and the proportion of innovation active firms with these arrangements with the science base (i.e., universities and/or government research institutes). This shows that the proportion of firms with these arrangements varies widely between countries, as does the proportion of firms with co-operation arrangements with the science base. Generally, however, only about 10% of innovation active service firms have co-operation arrangements with the science base. There does not appear to be any consistent pattern concerning whether innovating manufacturing or service firms are more likely to have these arrangements, although there is some evidence that manufacturers tend to be more likely to have these arrangements with the science base.

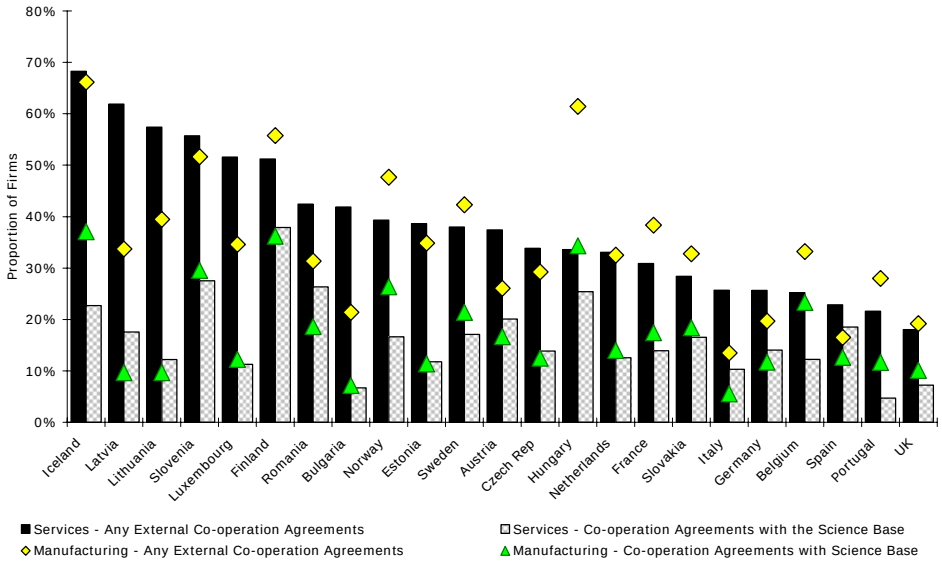
A similar picture emerges when the analysis is restricted to firms active in R&D rather than those that are innovation active (Figure 19). Again the proportion of firms with these arrangements varies widely between countries, and there is no consistent pattern as to whether manufacturers or service firms are more likely to have these arrangements. Overall, R&D active firms are slightly more likely to have these arrangements than are innovation active firms. Specifically with reference to having these arrangements with the science base, the proportion of R&D active firms with these arrangements tends to significantly exceed 10%, and is therefore considerably higher than the corresponding proportions for innovation active firms. This implies that engaging in R&D enhances the probability that a firm will form co-operative arrangements for innovation with the science base, possibly because it is better equipped to benefit from these arrangements. Lastly, it is notable that there is no consistent pattern as to whether R&D active service or manufacturing firms are more likely to have these arrangements with the science base.

Figure 2.18: The proportion of innovation active firms with co-operative arrangements for innovation with external partners, and with the science base in particular



Source: Eurostat (2006) Community Innovation Survey 3 1998-2000.

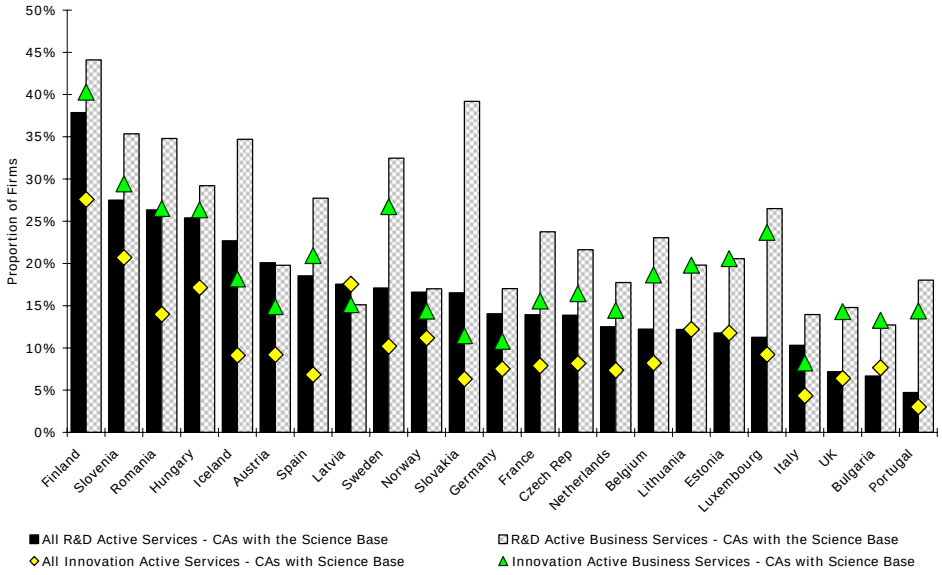
Figure 2.19: The proportion of firms active in R&D with co-operative arrangements for innovation with external partners, and with the science base in particular



Source: Eurostat (2006) Community Innovation Survey 3 1998-2000.

Figure 2.20 provides further information on these co-operative arrangements for innovation with the science base, as it presents evidence for business services alongside all services. This shows clearly that amongst both innovation active and R&D active firms, (technical) business services are more likely than all services to have these arrangements, implying that the proportion of services that are not business services with these arrangements is low. This may be due to a strong technical orientation to many of these co-operation arrangements.

Figure 2.20: The proportion of all services and business service firms with co-operative arrangements for innovation with the science base: R&D active firms and innovation active firms



Source: Eurostat (2006) Community Innovation Survey 3 1998-2000.

Summary

Overall, and in summary:

- For innovation, both manufacturing and service firms tend to draw most heavily on internal sources of information and from 'close sources', such as customers, suppliers and competitors. The science base (universities and public research institutes) are less widely engaged, although according to the European Community Innovation Surveys roughly a quarter of innovation active manufacturing and service firms used universities as a source of information for their innovation activities.
- The proportion of firms using these sources appears to vary widely between European countries, and in most but by no means all countries manufacturers are more likely to use these sources than are service firms. However, amongst service firms (technical) business service firms tend to be more likely to use these sources than all services, and indeed manufacturers.
- The proportion of R&D active firms that drew information from the science base was usually higher than the proportion of innovation active firms, suggesting that the conduct of R&D enhances a firm's ability to exploit the knowledge generated by the science base.

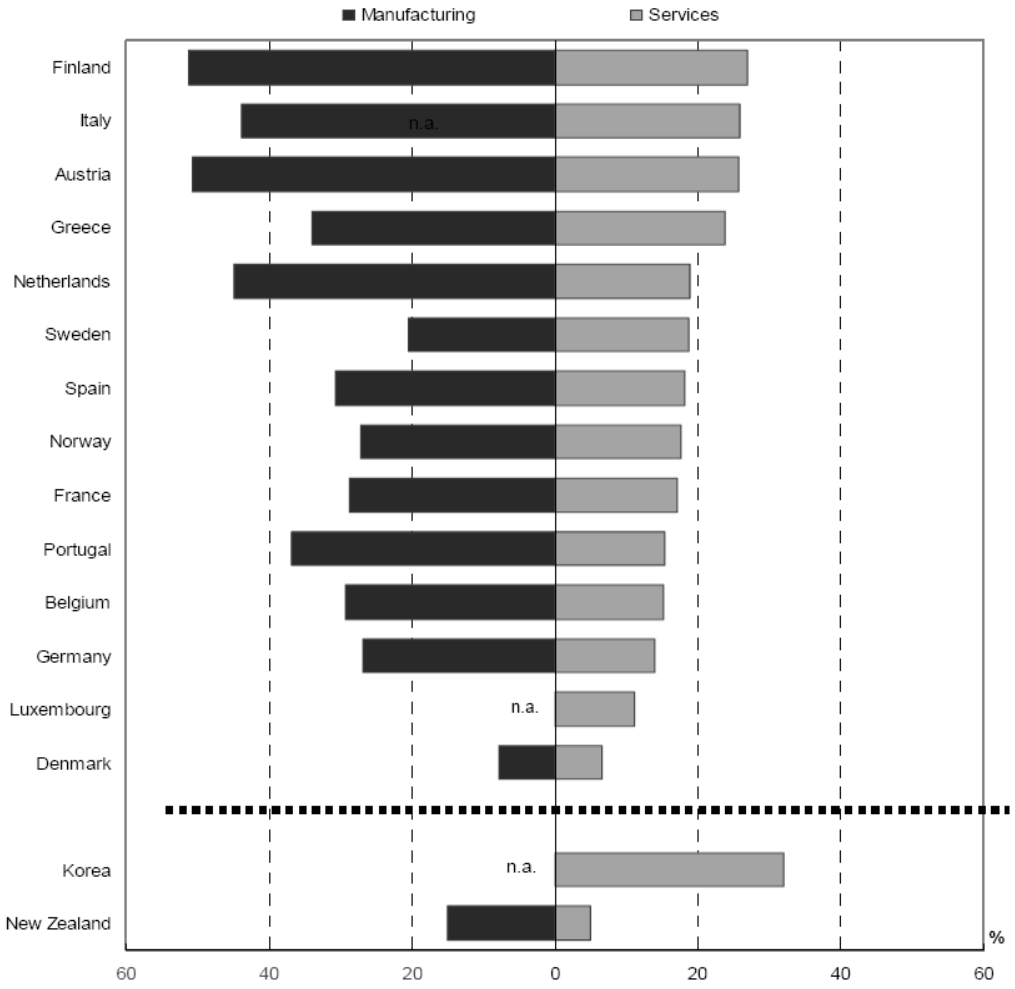
- The proportion of innovation active firms with co-operation arrangements for innovation varies between countries, but is roughly 10%. There is mixed evidence whether manufacturers or service firms are more likely to have these arrangements. R&D active firms are more likely to have these arrangements than innovation active firms, again suggesting the conduct of R&D has benefits when it comes to exploiting knowledge generated in the science base.
- Amongst services, business services are significantly more likely to have these arrangements than are services in general, suggesting there may be a bias towards co-operations focused on developing technical solutions.

2.7 Support for R&D in Services

This section explores the extent to which innovation and R&D active service firms have benefited from financial and other support from public bodies. To date, the service sector has not been a major target of innovation policy. In a recent survey by the OECD (2005b), most OECD member countries claimed not to have specific policies focused on innovation in the service sector. Instead, innovation policy measures in most OECD countries are regarded as 'sector-neutral' and are intended to be relevant to both services and manufacturing. This trend is part of a continuing shift throughout the OECD away from sector-specific policies and towards generic framework policies.

Overall, the share of firms indicating that they had received public support (financial and other support) for their innovation activities varied widely between countries, but tended to be greater amongst manufacturers, especially in those countries in which larger proportions of firms received support (see Figure 21. In Finland, Italy, Austria and the Netherlands, for example, between 45% and 50% of manufacturing firms reportedly received government financial support, compared to 20% to 30% of service-sector firms.

Figure 2.21: Share of innovative firms benefiting from public support programmes in manufacturing and services

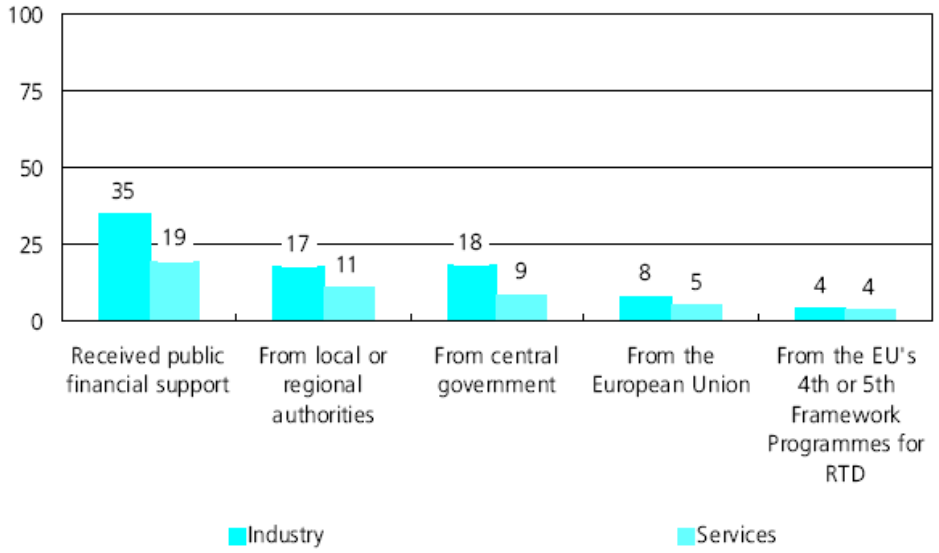


Note: Results of CIS3 and innovation surveys in other countries are not fully comparable. The time period is 2001-2002 for Korea, 2000-2002 for New Zealand; 1998-2000 for all other countries.

Source: OECD (2005) Enhancing the performance of the services sector. Paris. p. 169/ Eurostat, CIS3 Survey, 2004 and innovation surveys of Korea and New Zealand.

Figure 2.22 shows the apparent bias towards manufacturing in support for innovative activities is across the various sources of support. In the 1998-2000 period, innovating industrial firms (manufacturing, mining and utilities firms) were nearly twice as likely to have received public financial support for innovation as were innovating service firms (35% cf, 19%), and were twice as likely to have been the beneficiaries of support from central governments (18% cf. 9%). Support from the European Union is also more likely to assist manufacturers, although the difference is very small with the EU Framework Programmes, in part because only a small proportion of firms directly participated in these programmes.

Figure 2.22: Proportion of enterprises with innovation activity that received public financial support, EU, 1998-2000



Source: EU Eurostat (2004) Innovation in Europe Results for the EU, Iceland and Norway, data 1998–2001. p.25 / Eurostat, NewCronos (theme9/innovat/inn_cis3)

Further dis-aggregation (figure 2.23) shows that the firms most likely to benefit from public funding for innovation were innovation active large industrial firm – over half of these gained some financial support for their innovation activities, compared to just over a quarter of large innovation active service firms. Support from central governments tends to aid large industrial firm, which were more than twice as likely to receive support as large service firms. Meanwhile large service firms were twice as likely to receive support as were small service firms. Support from the European Union, including that under the Framework Programmes, is also more likely to benefit large industrial firms than either smaller industrial firms or large service firms.

Figure 2.23: Proportion of enterprises with innovation activity having received public financial support for innovation activities, by size & sector, EU, 1998-2000 (%)

		Public funding (any source)	Local or regional authorities	Central government	The European Union	EU's 4th or 5th framework programme
Small	Industry	32	18	15	6	3
	Services	18	11	8	4	3
Medium-sized	Industry	35	15	21	8	4
	Services	21	12	10	7	6
Large	Industry	57	22	41	22	17
	Services	26	12	16	14	10

Source: Eurostat, NewCronos (theme9/innovat/inn_cis3).

Source: EU Eurostat (2004) Innovation in Europe Results for the EU, Iceland and Norway, data 1998–2001. p. 46 / Eurostat, NewCronos (theme9/innovat/inn_cis3)

Further dis-aggregation (figure 2.24) shows significant variation within industry and services in the proportion of innovation active firms that benefited from public support for innovation. Although manufacturing firms were most likely to gain public funding to

support their innovation activities (34% received funding), business services (which here comprises computer services, R&D services, engineering services and technical testing) were not far behind (at 31%). Interestingly, these business services were actually more likely to gain support for their innovation activities from the European Union (including under the Framework Programmes) than were manufacturers. However, by contrast transport and communication and financial intermediation firms were the least likely to gain support for their innovation activities – with just 4% receiving support from Central Governments compared with 18% of manufacturers and 16% of business services.

Figure 2.24: Proportion of enterprises with innovation activity having received public financial support for innovation activities, EU, 1998-2000 (%)

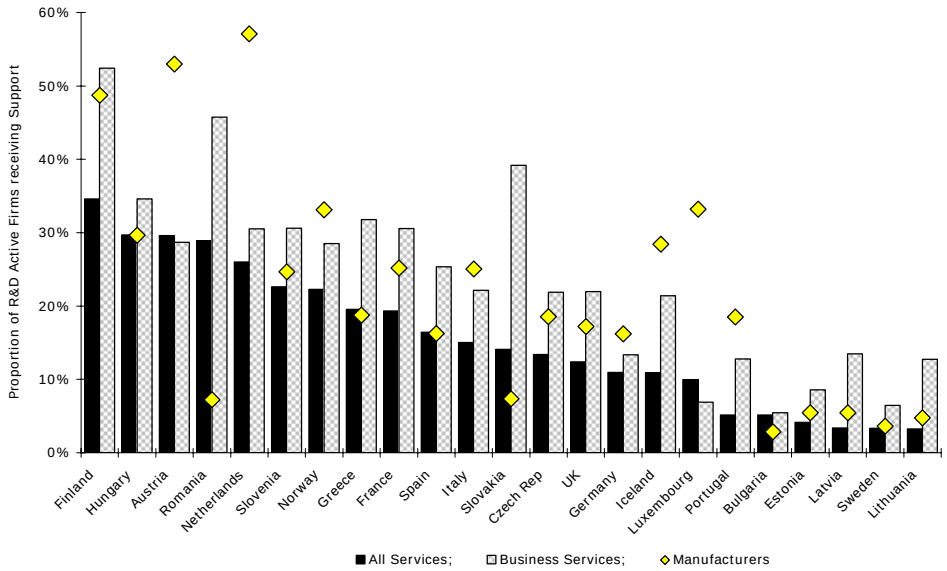
	Public funding (any source)	Local or regional authorities	Central government	The European Union	The EU's 4th (1994-1998) or 5th (1998-2000) Framework Programmes for RTD
Total	29	15	15	7	4
Industry	35	17	18	8	4
Mining and quarrying, and electricity, gas and water supply (C and E)	30	12	19	7	4
Manufacturing (D)	35	18	18	8	4
Services	19	11	9	5	4
Wholesale and commission trade (51)	16	9	6	4	2
Transport and communication, and financial intermediation (I and J)	11	7	4	2	1
Computer activities; R&D; engineering activities and consultancy; technical testing and analysis (72, 73, 74.2, 74.3)	31	17	16	9	8

Source: EU Eurostat (2004) Innovation in Europe Results for the EU, Iceland and Norway, data 1998–2001. p.57 / Eurostat, NewCronos (theme9/innovat/inn_cis3)

Until now, we have assessed the patterns of support for innovation active firms, rather than for R&D active firms. As shown previously, whilst service firms are marginally less likely to be innovation active than their manufacturing counterparts, they are significantly less likely to be engaged in R&D.

Figure 2.25 shows the proportion of R&D active firms that received financial support with their innovation activities. This shows that the proportion of supported firms varies widely across European countries. Around a third of R&D active service firms received support in Finland, compared with only 3% in Sweden. Meanwhile, in most countries the share of R&D active service firms receiving support tends to be lower than the corresponding share of R&D active manufacturing firms. Large differences are apparent for Austria, the Netherlands, Finland, Iceland and Luxembourg, for example. In a few countries these shares are roughly equal, and only in Romania and Slovakia are R&D active service firms more likely to gain financial support for their innovation activities than are their manufacturing counterparts. Also shown are the proportions of R&D active business service firms gaining financial support for their innovation activities. In almost all countries this share is higher than the corresponding share for all services, and in several countries this share exceeds the corresponding share for manufacturers, indicating that it is this sub-set of firms within services that are the primary beneficiaries of financial support for innovation in the service sectors.

Figure 2.25: The proportion of R&D active manufacturing and service firms receiving financial support for their innovation activities

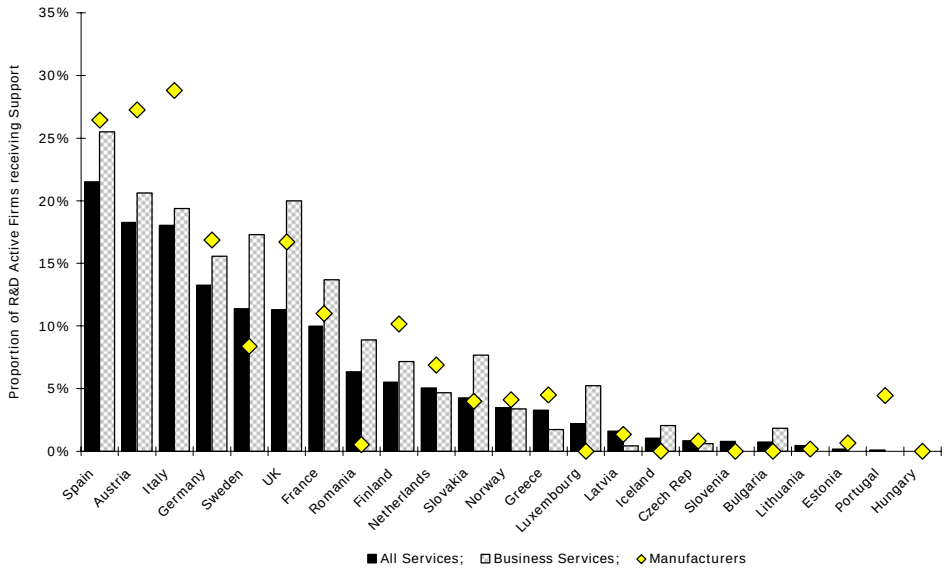


Source: Eurostat (2006) Community Innovation Survey 3 1998-2000.

Further analysis shows that the proportion of firms receiving financial and other support from national sources (including local, regional and central government sources) varied widely across the European Union (figure 2.26). Amongst R&D active service firms, Spanish firms were the most likely to gain support, followed by Austrian and Italian firms. However, in Eastern Europe, very few firms received this support. Overall, R&D active service firms were less likely to receive support from national sources than their manufacturing counterparts, and this is especially true in those countries where a higher proportion of firms receive support for their innovation activities. Only Sweden and Romania buck this trend. Meanwhile, it is again clear that business service firms are more likely to gain support for their innovation activities than are other services. Yet, interestingly, in only a few countries (such as France, Sweden and the UK) were these business service firms more likely to gain support than were manufacturers.

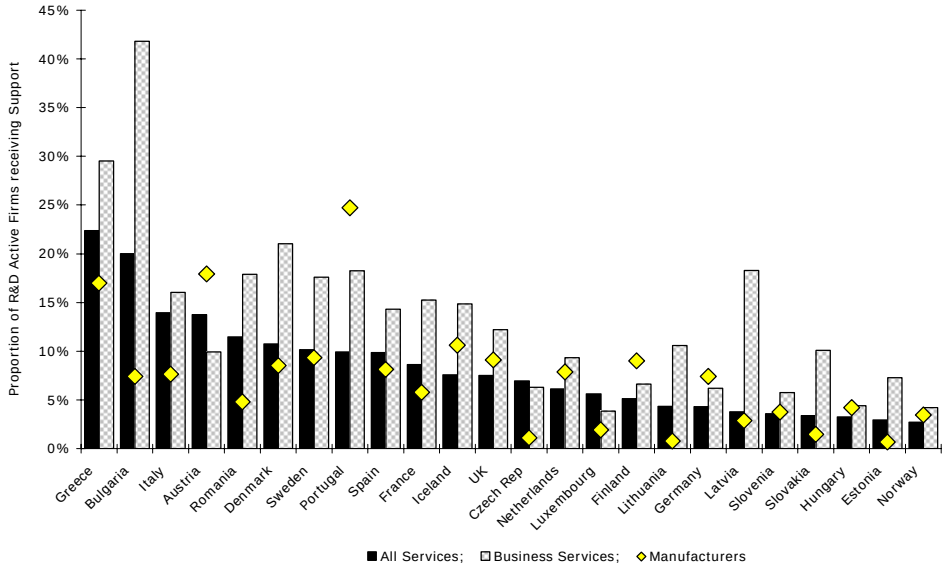
Finally, we assess the receipt of support for innovation from the European Union amongst R&D active firms. Figure 2.27 shows that the proportion of service firms receiving support again varied widely between countries, but overall there appears to be less of a manufacturing bias to this support – only in Portugal and Austria is this very pronounced. By contrast in other countries such as Italy and France service firms were more likely to receive support from the EU than were manufacturers. Interestingly, however, in almost all countries business services were significantly more likely to gain support than were all services, implying that the less technically oriented services (such as transport and distribution) are less likely to benefit from EU support for innovation. All told, it would appear that amongst R&D active firms the EU funding for innovation is less biased towards manufacturing than are many of the support programmes provided by individual member states.

Figure 2.26: The proportion of R&D active manufacturing and service firms receiving support for their innovation activities from national sources



Source: Eurostat (2006) Community Innovation Survey 3 1998-2000.

Figure 2.27: The proportion of R&D active manufacturing and service firms receiving support for their innovation activities from the European Union



Source: Eurostat (2006) Community Innovation Survey 3 1998-2000.

Summary

Overall, and in summary:

- The proportion of firms that receive financial and other support for their innovation activities varies widely across Europe, but overall there is evidence that amongst those that are innovation active, service firms are less likely to receive support than are their manufacturing counterparts. Thus despite the intention that innovation policies are 'sector-neutral' the reality would appear to be that they favour manufacturers over service-sector firms.
- This apparent bias in favour of manufacturers appears to exist for programmes provided by individual countries and the European Union, but is most pronounced for support provided by national governments.
- Amongst innovation active firms, large manufacturing firms are by far the most likely to gain financial support for their innovation activities. They are twice as likely as large service firms to gain this support. This apparent bias towards manufacturing is particularly pronounced in the support received from national governments, although it also exists with the support provided by the European Union, and from local and regional authorities.
- Amongst innovation active services, business services are considerably more likely to receive support than are other services. Interestingly, business services were more likely to receive support from the European Union than were manufacturing firms. Few transport and communication and financial intermediation service firms received support with their innovation activities.
- Amongst R&D active firms the proportion of firms receiving support for their innovation activities also varied widely between countries, but in most R&D active service firms were less likely to receive support than their manufacturing counterparts. Amongst services, business services were usually more likely to gain support than were other services.
- In most countries, national support innovation appears to favour manufacturing firms over service firms amongst those active in R&D, but there is less of an apparent manufacturing bias amongst firms benefiting from support from the EU. In many countries, business services are the most likely to receive support from the EU amongst R&D active firms.

3 Key findings case Studies

3.1 Study design

In recent years, the realisation that services will play a decisive role in future national economic growth has gained acceptance in Europe. Business-related services in particular are reckoned to have huge potential for growth and employment. At the same time, the question of how this potential can be fully exploited and what contribution it can make to greater encouragement of Research and Development in the case of business-related services poses itself increasingly often. In order to develop a targeted promotion strategy the obvious first step is to examine the current status of Research and Development of business-related services and the extent to which such R&D issues have penetrated the European economy.

This objective was picked up as part of the "Evaluation of R&D Needs of Business-Related Service Enterprises" project which is supported by the European Commission. This involved surveying companies that offer services in the business-to-business area. Because, until now, there have been relatively few empirical investigations of research and development of business-related services, the study that was conducted was somewhat exploratory to a certain extent, i.e. it was intended, in particular, to capture and analyse the state of knowledge and applications in practical operations rather than to confirm models or theories.

The case studies formed an essential element of RENESER. The information obtained through the case studies was intended to provide knowledge, in particular, of how business-related service enterprises carry out Research and Development and to yield insights into their needs for support in concrete terms. Attempts were made to answer the following individual questions through the case studies:

- What basic understanding do service companies have of Research and Development?
- What is the nature of the R&D activities carried out? What are typical examples?
- How is Research and Development organised and how is it integrated into corporate strategy?
- To what degree are they able to link into external public and private knowledge bases?
- How closely are companies integrated into public research promotion schemes?

The case studies made an important contribution towards identifying existing practical approaches and future needs for action in order to promote Research and Development for services.

When selecting the companies that were to be surveyed, the sample was clearly confined to firms already engaged in Research and Development of services that had many years of experience in this field. There was deliberately no further imposition of restrictions on the selection of companies, for instance by sector or by company size. The case studies concentrated on business-related service companies . In addition, four manufacturing firms and hybrid companies (Atrium Oncology, Océ, Siemens Medical Solutions, Telefónica I+D)

that offer their business customers services that are closely related to material goods were added.[14] Members of management responsible for Research and Development within the companies surveyed were addressed as the target group. This made it possible to obtain well-founded statements regarding strategic and operational questions in relation to the development of new service offerings.

Extensive research of the literature on the state of knowledge was carried out by way of preliminary work prior to developing the survey tools and four so-called Topical Papers were prepared. The knowledge thus obtained was fed into the subsequent design of a semi-standardised interview guide. Besides general company information, questions concerning R&D strategy, R&D function, R&D cooperation and policy issues related to services' R&D were selected as crucial topic areas. After a dry run on selected companies, the interview guide was ultimately used to carry out all the case studies.[15]

The case studies were carried out over the period from November 2005 to May 2006. As a rule, several representatives of each firm were interviewed during detailed discussions and workshops. The four research establishments involved in the Project conducted a total of 21 case studies in Great Britain, Germany, the Netherlands and Spain. All case studies were documented using a foixed format and then authorised by the companies[16]. The selected format of semi-standardised interviews proved to be expedient because it made it possible to gain a broad insight into company activities on the basis of the predefined topics but also provided sufficient scope for more in-depth exploration of especially interesting issues. In particular it gave the opportunity to examine innovative special approaches and solutions of companies in detail.

This was followed by analysis and preparation of the results. The emphasis was on formulating well-founded theses on Research and Development for business-related services and on illustrating them by suitable examples from the case studies. In view of the number of case studies (21) the reader is reminded that these results make no claim to be representative - only a wide-ranging empirical survey can make such a claim. To this extent, the study is somewhat exploratory in nature. It nevertheless offers a range of interesting insights intended to stimulate wider discussion. In addition, the results of the studies offer a range of interesting suggestions both to business-related service enterprises as well as for project funding organizations.

The 21 case studies which were all separately reported following a fixed format cannot be presented here in full detail. After finalizing the case studies 1-2 page syntheses were made[17] allowing interested readers to have a more detailed understanding of individual cases. In this case study chapter of the main report we will first provide an - admittedly rather crude - overall picture (section 3.2) before dealing with major issues ranging from conceptualization of R&D, to organizational and strategic issues related to service R&D, formalization of R&D, links to the science base, use of R&D programmes and suggestion for R&D and innovation policies (sections 3.3-3.10). In these sections we have included examples taken from the set of case studies. This is a selection as the cases offer numerous nice examples as to how the 21 firms are currently dealing with service R&D and innovation. Finally we briefly assess the robustness of the results presented (section 3.11).

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[14] A brief characterization of the 21 firms involved in the case studies is included as Annex 2.

[15] The interview guide is included as Annex 3.

[16] As some of the cases dealt with confidential material and insights not all case studies will be made available in full detail. Those that can be made public, will be made available in the near future.

[17] These 21 brief syntheses are included as Annex 4.

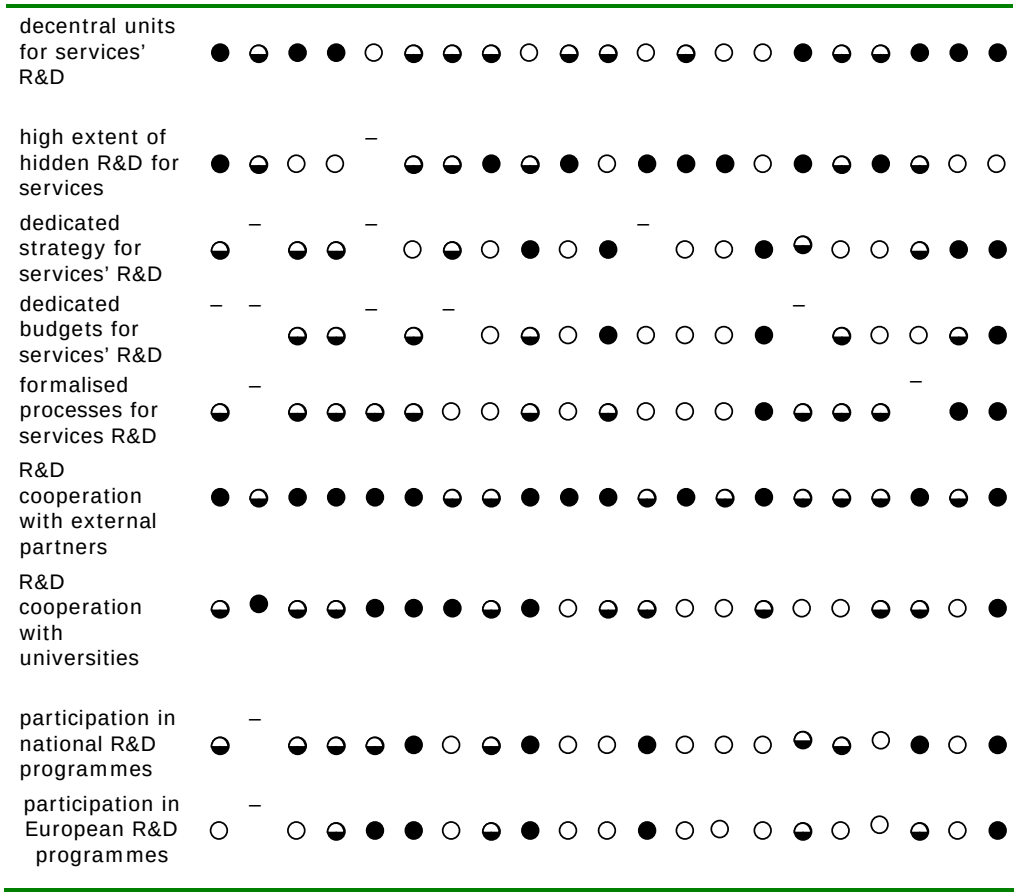
3.2 Overall overview case study results

In markets that are becoming ever more dynamic, service companies can no longer achieve decisive advantages through cost, quality or technology leadership alone. There is an increasingly significant trend towards differentiation through innovative services which more and more create a decisive unique selling proposition compared with competitors in many sectors. The crucial challenges for companies are, above all, to continuously offer enhanced or new services in the market, do this more quickly than one's competitors and, at the same time, meet customers' needs and expectations.

The RENESER case studies show that business-related service firms are responding by beginning to tackle Research and Development for services more energetically. Nevertheless, the main focal points of R&D and the way these activities are organised, budgeted and managed are mostly differently designed when compared to manufacturing firms, but so also show considerably variety among the set of service firms included in our sample as is evident from table 3.1 below. It is almost impossible to characterise rather detailed case studies in a set of very crude symbols. It does however show that on some dimensions the case study firms are quite similar (the importance of hidden R&D, the prevalence of more decentralised approaches to R&D, the importance of innovation in co-operation with third parties), whereas on other dimensions the variety is huge (the conceptualisation of R&D, the use of central R&D units, the participation in public R&D programmes). This table must therefore be treated as indicative and not be seen as a summary table.

Table 3.1: Main characteristics of services' R&D within the analysed cases

	Ahold	Aptium Oncology	DB Dialog	DIN	EL CORTE INGLES	Fraunhofer	GRUPO SANTANDER	Fujitsu Services	IBERIA	itfc	METRO Group	METRO DE MADRID	Network Research	NPD/consultancy firms	norisbank	Océ	Rabobank	Randstad	Roke Manor Research	Siemens Medical Sol.	TELEFÓNICA
activities in services' R&D&I	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
routine use of term "R&D" (for services)	◒	○	○	◒	●	◒	○	○	◒	○	○	○	○	○	◒	◒	◒	○	○	●	●
technological focus	◒	●	◒	◒	○	●	○	●	○	●	●	◒	◒	●	●	●	◒	○	●	●	●
focus on new services	◒	○	○	●	●	◒	●	◒	◒	◒	○	●	◒	○	●	◒	◒	●	○	●	●
focus on new organisational and HR concepts	◒	◒	◒	○	◒	○	○	◒	●	○	◒	●	◒	○	○	○	●	◒	◒	○	●
central unit for services' R&D	◒	○	○	○	●	○	◒	○	●	○	○	●	◒	○	●	●	○	○	○	◒	○



● yes
◒ partly
○ no
– no information available

In the remainder of this chapter we discuss the key dimensions of the case studies performed in somewhat more detail and illustrate some of these central findings using examples from the various case studies.

3.3 Conceptualisation of R&D

Giving the increasing economic importance of services, the traditional growth model based on increased use of labour, capital and land is becoming less important and the "idea-driven growth" paradigm is increasingly establishing itself as a new explanatory model. It is based on the realisation that innovation – especially in the area of intangible services - is becoming an increasingly important factor in the success of entire national economies.

This paradigm shift is manifesting itself particularly clearly if one analyses typical service markets. It is apparent that market situations and competitive structures are subject to constant change and that the pace of dynamic innovation has accelerated unmistakably. Against this background of increasing competition, successful companies no longer try to

achieve decisive advantages through cost leadership or advances in quality or technology alone. They tend to differentiate themselves through innovative services that give them a decisive unique selling proposition compared with their competitors. The crucial challenges are, above all, to continuously offer enhanced or new services in the market, be quicker than one's competitors and, at the same time, meet customers' needs and expectations.

However, many companies are confronted with the problem that current corporate structures and processes are not designed for efficient development and market positioning of services that are to be provided professionally and, in particular, there are no appropriate tools for strategic and operational planning of innovation processes for services. Problems very often start with the fact that the services offered by companies are not clearly defined, i.e. there are no unambiguous descriptions of service contents, relevant processes and required resources. The consequences are, besides lack of transparency and interfacing problems, inadequate ability to integrate new services in particular.

Companies have therefore begun to grapple with issues relating to services' R&D more seriously. In all the companies surveyed there are more or less distinct R&D activities even though the abstract concepts used for them are often not without ambiguity. Although all the companies surveyed are familiar with the term "R&D", only roughly half of them use it routinely. In the majority of cases R&D is mostly associated with technological R&D, i.e. the development of new technologies or applying new technologies (mostly ICT) in a new context or for servicing the ‘service machinery,’ i.e. creating the technological facilities and platforms on which the services are provided. R&D is less associated with creating new services or new service development. Various phrases such as product or new service development, customer focused innovation, business development, service improvement or (more specifically) advanced retailing are used for these activities. This implies that, in practice, important services’ R&D and innovation activities are hidden behind labels such as business development, service improvement, etc., without being recognised as services’ R&D. A lot of services’ R&D is also concealed in client-specific solutions (that may later on serve as a basis for developing more standardised service products).

Like the understanding of the term “R&D”, the breadth of the Research and Development activities carried out also varies in the surveyed companies. Relatively heavily technology-oriented Research and Development is carried out in more than half of the companies. In some cases it is not a matter of simply adapting new technologies to support service business but rather of companies playing an important role in fundamental development of new technologies (e.g. RFID in trading companies). In contrast to technology-oriented Research and Development, the development of new services or new service concepts is only important in slightly less than half of the companies surveyed. The term "Research and Development" continues to be understood to mean the design of new processes (in roughly a third of the companies surveyed), creating new distribution channels (roughly a quarter of the companies) and, in a few cases, concepts for social changes in the company ("social innovation").

Finally, it should be pointed out that, although the service-only companies surveyed in the project have a predominantly technology-oriented understanding of Research and Development, interestingly, the boundary seems to be blurring more and more in the case of both the interviewed producing-only companies . So, less and less of a distinction is being made between R&D for material goods, ICT and services.

BOX 3.1: EXAMPLES OF R&D IN SERVICE FIRMS

R&D&I activities at Network Research

Network Research is a medium-sized 'full service' Market Research agency based in London. Activities include telephone interviewing, multi-method customer satisfaction surveying, data interpretation, information packaging and research consultancy. Innovation within Network Research takes three main forms. First, there is a strong *organisational* component (witnessed as the company has progressed towards a redefinition of its activities). Second, there is considerable *technological* innovation, for example the development of software to enhance data collection and analysis processes. Third, there is evidence of the allocation of significant effort to the development of *new service offerings*. Some recent examples of innovation enterprise serve to demonstrate the breadth and nature of innovation activity within the organisation:

- *Methodologies and new research instruments* – methodology has been a key locus of innovation effort within Network Research during the past decade – development of more sophisticated approaches to research (and approaches that are tailored to meet the needs of specific clients) have been a priority. An important advance in the past few years is the development of telephone 'depth-interviewing' techniques. Whereas most telephone-based Network Research has previously involved application of relatively closed interview schedules, deployment of new technologies (supported by innovative scripting, novel software, and high-levels of training) has facilitated the roll-out of more qualitative telephone-mediated studies.
- *ICTs and software development* – investment in software (both contracted and in-house) has been of a high-order during the past ten years. Key developments have been achieved in the fields of Computer Aided Telephone Interviewing (CATI) and Computer Aided Personal Interviewing (CAPI); online interviewing (scripting and prompting); and, data-coding. Network Research's representatives indicate that such developments have resulted in (a) major increases in efficiency and scope, (b) improvements in confidence in outputs, and (c) cost-reducing organisational restructuring (to accommodate new working processes).
- *Delivery* - development of on-demand, rapid response and real-time reporting and information services has been a major concern for Network Research. The company is working towards the development of 'narrowcasting' services via the web wherein senior executives in client companies can access results presentations at any time and any location (with a broadband link).
- *Knowledge Production and Organisational Innovation* – along with other industry players (and as indicated above), Network Research is re-orienting itself as a provider of consultancy and value-added services. This has required a significant degree of organisational innovation as the company has shifted in favour of the provision of high-quality, knowledge-intensive consultancy services. Simple reporting has been replaced by a greater focus on interpretation of research results, identification of market gaps, and exploitation of opportunities for brand development. Contextualising the results of market research for clients is becoming a core function for the company.
- *Techniques to access and exploit secondary data* – NR has recognised that there is a vast amount of statistical material and qualitative data available from public sources (National Office of Statistics, Health and Safety Executive in the UK etc.): it has further recognised that this data can be exploited (relatively inexpensively) for the benefit of clients and has been engaged in the development of techniques to gather and manipulate available materials in order to derive focused subsets that can be deployed in client projects.

Technology-oriented R&D at METRO Group

Right now, *Radio Frequency Identification technology (RFID)* has stirred intense interest. This technology enables product data to be transmitted in a non-contact manner. The METRO Group – Germany's leading trade and retailing company – is one of the pioneers in the development of this technology. Thanks to RFID technology, shopping will become more attractive, individual and pleasant for customers in the future. It will also help improve efficiency in the areas of product supply and logistics, and cut costs. Radio Frequency Identification (RFID) is a key technology for the design of efficient supply processes and improvements in shopping convenience. This innovative technology will

fundamentally alter the process chain in the consumer goods industry. The main areas of application are logistics, merchandise stockpiling and individual customer service. The heart of this technology is the so-called smart chip, a small computer chip with antenna. An electronic product code (EPC) is stored on the smart chip and can be read without direct contact or any visual connection by an RFID reader. In the merchandise management system, information such as the expiration date or the manufacturer of a product can be assigned to the EPC. A data base also traces the route of a delivery from production to the market. In July 2004, the METRO Group established the *RFID Innovation Center* in Neuss to help promote the use of RFID in retailing. At this center, suppliers, IT partners and representatives of the Metro sales brands test the professional implementation of this technology under real-life conditions. In addition, in November 2005, the METRO Group and the standardisation organisation GS1 Germany launched Europe's only research and test center for RFID, the 'European EPC Competence Center'. Here, consumer goods manufacturers apply standardised processes, among other things, to improve types of transponders and optimize the placement of smart chips on packaging units. In practice, more than 20 partners from the consumer goods industry have equipped part of their merchandise pallets with smart chips since the technology was introduced in the logistics area.

easyCredit – a highly automatised instalment credit developed by norisbank

The norisbank AG was established in 1998 as a result of the merger of the Franken WKV Bank GmbH with the Noris Verbraucherbank GmbH. The predecessor institutes of the Noris Verbraucherbank GmbH were the first financial institutes in Germany to introduce customer self-service in 1975 and the first to offer BTX ("Bildschirmtext", i.e. "interactive videotext"), electronic banking services in the market in 1979. The norisbank has always attached high importance to the development of new products. The introduction of the easyCredit instalment credit in 2002 is considered one of the most important innovations. For the first time ever, a credit concept was presented as a brand product and attached positive attributes, for example, by deliberately highlighting a positive attitude towards consumption. Another special characteristic of easyCredit is the fact that it is marketed not only by the norisbank but also through other partners. Meanwhile, for instance, about 60 % of the business with easyCredit is generated by the "Volks- und Raiffeisenbank" banks. Other characteristics of easyCredit are customer-focused expert advice as well as quality and efficiency achieved by system-supported decision-making processes. This makes it possible to come to a decision about credits for amounts up to 75,000 Euros in only a few seconds. Other innovations going along with easyCredit are the introduction of easyCredit shops ("product shops instead of branch banks"), the conception of a comprehensive insolvency protection scheme and a number of new marketing strategies and activities.

3.4 Motivation for services' R&D

Many of the companies surveyed only began dealing specifically with Research and Development for services in recent years. Within the study, the question regarding the concrete reasons that motivated the companies to become more active in this field is an interesting one.

The reason most often cited is to preserve or boost their own competitiveness. Many of the companies surveyed report increasingly dynamic markets, the emergence of new competitors and widening ranges of choice for customers that necessitate profiling through enhanced or new services. An equally frequently-mentioned trigger for new services is customers' wishes. This includes both actively expressed customers' requirements as well as attempts to improve customer loyalty initiated by the companies themselves. The third and fourth most frequently-cited reasons for services' R&D in the study are cost reductions and/or efficiency improvements (mentioned by roughly a third of companies) and the use of new technical capabilities (mentioned by roughly a quarter of companies). Other reasons that are often mentioned include market deregulation and the trend toward outsourcing and higher value specialised services.

If one considers the reasons for growth in services' R&D overall, it is apparent that both proactive as well as defensive considerations play a roughly equal role among the surveyed companies.

Besides the question of motivating reasons, interviewees were also asked to state the most important obstacles to systematic services' R&D in their view. Here there was a broad range of responses. The most frequently cited obstacle is insufficient support by top management (in roughly a quarter of cases), followed by inadequate resources (also roughly a quarter of the companies). Other frequently mentioned reasons include overriding preoccupation with day-to-day business, customers' unwillingness to pay for new services, insufficiently innovation-oriented corporate culture, inadequate exchange of R&D knowledge within the company and lack of organisational infrastructure to carry out R&D tasks.

BOX 3.2: MOTIVATION FOR SERVICES' R&D

What market trends drive Océ into the direction of client specific solutions?

Although generally known, organised and managed as a goods-oriented manufacturing company Océ has over the years added a large variety of services to its portfolio. Océ is currently dependent on revenues generated through its various services (of which some 50% are product-related services) for more than 70% of its turnover. In fact this shift has the character of a complete (paradigmatic) shift from a hardware or product-based business model towards a (much more) customised services business model in which it is not machines or even the number of copies made that counts, but the profit made on client specific-service contracts. Two major related trends in the market – apart from the switch to digital printers, digital documents and colour printing machines – can be observed. In the first place, a trend towards increasing service content and what used to be labelled as a higher 'customer intimacy' can be identified. Customers are asking for complete solutions i.e. combinations of hardware, software and services. Customers increasingly want integrated solutions to manage their office documents. Therefore key major accounts are increasingly offered additional services such as output management and document management solutions, fleet management archiving and scanning services in addition to printing services that help to control their costs (e.g. by using more centralised printers, web-based ordering, print job management). A second development is the trend of clients striving towards reducing the cost of ownership, document process outsourcing and hence, for Océ, a more service-based business model. There is a gradual development from supplying the machine and the related maintenance services and supplying paper, toner and supplies towards additionally offering financial services, taking over people from the repro and related service departments towards eventually exploiting an infrastructure in-house with a certain functionality. Increasingly, large accounts want the purchasing of printing and related services without the need to purchase or lease the actual systems. Eventually they are interested in buying a certain functionality and therefore increasingly outsource document handling processes. In fact it requires a complete shift from a hardware or product-based business model towards a customised services business model in which it is not the machines or even number of copies made that count, but the profit made on client-specific service contracts.

The New Model of Innovation of TELEFÓNICA I+D: Telefónica I+D was created in March 1988 as a separate business unit of Telefónica Group to externalise and benefit from Research and Development, segregating activities and people previously employed within Telefónica. Nowadays it has 1,271 professionals (93.94% of which had a university educations and 26% of the staff are women) and, in 2004, Telefónica invested nearly 2,400 million euros in technological innovation, according to the criteria of the OECD. In short, Telefónica I+D's mission focuses on improving the Telefonica Group's competitiveness through technological innovation and product development. In 2004, Telefónica I+D established a New Model of Innovation in accordance with the strategy of the group. It considers technological, commercial and operative processes innovation. Its execution is impelled from the Corporative Committee of Innovation. Its main objective is to coordinate a Plan of Innovation and to manage the portfolio of technological options of the group. The secondary objectives of this model are the following:

1. To line up the Technological Innovation with the strategy of the Group, anticipating more differentiating solutions.

2. To enhance the collaboration with public administrations and universities to improve the innovation process.

3. To promote the collaboration with other agents of the value chain and of harnessing the enterprise alliances in the innovating process.

4. To improve the competitiveness of the group through technological innovation based on a better knowledge of the customers' necessities and on the provision of more segmented and specific solutions.

5. To strengthen an innovating culture in all the organisational levels. This model promotes, in addition, the collaboration with other agents, who will become "technological allies" (public clients, administrations, suppliers, other companies, etc.) as well as the participation of the professionals of the group.

The Telefónica's Innovation Model systematises R&D&I corporative policies, management tools (such as the innovation website) for R&D projects and indicators of innovation (success, portfolio, following-up and financial indicators), conforming the system of management of the R&D&I of the corporation as well as the innovation plan of each business unit of the corporation.

3.5 Organisational arrangements

The question of the extent to which the R&D function is organisationally anchored in the company is an essential part of the case studies. In terms of the arrangements for organisational responsibility, the four following basic alternatives were considered:

- Research and Development in organisational units (e.g. New Service Development, Service Engineering) specifically set up for this purpose,
- Takeover of R&D activities by existing organisational units (e.g. Marketing, Sales),
- Research and Development in the form of cross-divisional project teams,
- Outsourcing services' R&D to an external partner (e.g. contract research).

In almost all the companies surveyed, Research and Development for services takes place in the form of project teams. In the overwhelming majority, these teams are cross-divisional, i.e. include employees from various business units. Central responsibility is mostly entrusted to divisions that have relatively high levels of contact with customers such as Marketing, Product Management or Sales. It is also noticeable that IT Departments are relatively heavily represented in project teams in the surveyed companies.

The fact that Research and Development is carried out in a large number of cross-divisional projects running side-by-side must be one important reason why most companies are unable to provide precise information on the extent and scope of their R&D activities. Interviewees often report "hidden R&D", i.e. nobody in the company knows who exactly deals with services' R&D. In some of the major companies surveyed, it is even reported that several hundred employees are active in projects in which R&D tasks are performed but they are not regarded as such within the company.

The main drawback of R&D teams that collaborate temporarily and each have changing responsibilities is the fact that the knowledge acquired at the end of the project is often lost because the employees involved move on to other tasks. This is the reason why more than half of the companies questioned in the study have already opted to assign services'

R&D to existing organisational units as an ongoing ancillary task. The aim of this is to ensure that new services are developed continuously and the required knowledge can be built up and expanded. When asked which organisational unit was entrusted with services' R&D, the companies respond that they usually opt for Business Development, Marketing, Product Management or the specialised departments that are operationally active with customers. This is yet more evidence that the intensity of contact with customers seems to be an important criterion for companies when it comes to allocating services' R&D.

In order to further professionalize the development of services, a few of the interviewed companies (5 in all) have opted to set up dedicated organisational units whose main task is Research and Development of services. This has the advantage of making it possible to separate activities from routine business and build up R&D know-how for services selectively. Because all the companies investigated in the study are major companies but small organisational units were involved in every case, there is reason to suspect that, in practice, no great importance is attached to this option.

The fourth organisational alternative mentioned in the introduction, full outsourcing of Research and Development of services, is not encountered in the surveyed companies. It should nevertheless be noted that great importance is attached to integrating external partners into development of services. Admittedly, external partners only take over individual subtasks rather than entire development of a new service. More than three quarters of the companies surveyed stated that they integrate selected consulting firms, software houses, market researchers, legal experts or other specialists into their R&D activities.

It should be pointed out that there appears to be no "one best way" in terms of the form of organisation adopted for developing services in the opinion of the companies surveyed and that a correspondingly large number of disparate options are selected in practice. Also, in many companies there seems to be various organisational solutions that exist side by side. Is therefore quite possible that a company, despite having a dedicated department for Research and Development, develops new services in other organisational units such as Marketing or Sales for instance.

Final consideration of the forms of organisation mentioned by the companies makes it clear that services' R&D is a task that affects a variety of divisions both inside and outside the company. To this extent, one of the major challenges in the future will without doubt be to devise appropriate forms of organisation - especially for working in networks and mastering interfaces - that are suitable for getting to grips with existing complexity, thus providing an actual foundation for fast, efficient development of new services.

Moreover, it should be mentioned, that creating a services innovation culture (and an open management style) or at least a corporate culture where innovation is valued, was used in quite a number of the case study firms to support innovation company-wide and trigger bottom-up innovation.

BOX 3.3: ORGANISATIONAL ASPECTS OF SERVICES' R&D

Characteristics and orientation of R&D activities at Randstad

Dutch-based Randstad Group (€ 6,638.5 million in revenues in 2005) is one of the largest staffing and human resources service organisations worldwide. At Randstad, Services R&D and innovation is generally hidden. This by no means implies that no services R&D takes place at Randstad. In fact there are various ways in which Randstad invests in services R&D and innovation, albeit under different labels. In a way, R&D and the innovative capacity is embedded in various activities such as:

- A corporate culture in which all Randstad key employees can contribute to (and to a certain extent are responsible for) the overall intelligence function and can put forward suggestions and pick up signals regarding how to improve work processes and what new services to offer. Typically, Randstad consultants are well educated and in contact with both business clients and potential, individual candidates. In fact these consultants run their own outlet and must possess a certain degree of entrepreneurship. The Randstad organisation is relatively flat, and consultants on the shop floor can easily make suggestions to the location manager or regional district manager. Randstad management steers quite intensively on this type of open, corporate culture and approximately 80% of all managerial positions are filled with Randstad's own people, thus ensuring that the greater part of management has a thorough understanding of the business.
- Process managers of the in-house services are generally concerned with optimising processes and hence incremental process innovations at the site of the business client. They are tempted to organise dedicated client-specific solutions. This has to be kept within limits so that additional services can be sold at a later stage. The various process managers interact to jointly propose changes and innovations.
- Within the Randstad holding company a small group of professionals is responsible for business concept development. While this small unit does not develop completely new innovative services, it scans Randstad practices worldwide, selects best practices, describes them in great detail, standardises these new services and – after approval from the highest level – diffuses them as the standard way of working to those countries where these services are offered (These have to be adapted to local circumstances such as local regulation). In fact this can be labelled as a form of innovation diffusion and knowledge management.
- Another small group of professionals operating close to the market are responsible for strategic international accounts. This group interacts intensively with major international top accounts. If a new service is required this is detected and an international project team works on a dedicated solution. Randstad has a considerable number of business and process consultants from different backgrounds who are able to contribute towards solving this type of problem and develop new service solutions that may form the basis for more regular service products at a later stage. Typically, the counterparts in a few selected top clients are today co-producing part of Randstad's new services.
- Another source of 'R&D' and innovation are administrative and ICT systems that should help in creating efficient back office (including knowledge management systems) and front offices for Randstad. These administrative and ICT systems can also help in realising process innovations such as electronic billing systems, new front office systems or shared service centres. Around 2000, Randstad developed a completely automated matching system which, although it failed commercially, parts of it are still used in internal Randstad working processes. In fact these are the massive, almost manufacturing like business processes running in the background of a typical service enterprise!

Hidden R&D at ITFC

Independent Television Facilities Centre (itfc) is a major provider of technical and content support services to the television broadcast sector in the UK and beyond. Headquartered in London, the company supplies post-production and video services including: subtitling; captioning; audio description; and, preparation re-purposing and distribution of video-based materials. Itfc currently employs around 170 people. With no R&D budget, resources for development are found from 'slack' in

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procurement budgets - technology procurement prices are inflated to provide 'fat' to support development work and the purchase of R&D facilitating kit. Most of itfc's engineers and technicians (about 1/3 of all staff) are involved in R&D on an ongoing basis and many spend 20-30% of their time on development-related work. However, some work very long hours and undertake development projects outside standard working hours (thus real extent of and expenditure on R&D effort is almost completely hidden). Development engineers are employed on a project and contract basis but expenditure in this regard is limited.

Ahold's R&D function: centralised versus decentralised

Until now Ahold's R&D function is not designated or fully formalised within the organisation. No employees are assigned with specific R&D in their job description. Nevertheless, the increasing (global) competition and consumer wishes give rise to the increasing need for a more coherent view on R&D processes and innovation. Most of Ahold's R&D is decentralised, which means that most of the R&D is performed by several hundreds of employees in the subsidiary companies (at Arena level) through the suppliers. Within Ahold there is no strict hierarchy, it can be seen as a management holding structure with different arenas supported by central units. The bottom-up approach used at Ahold has grown historically. 90% of the new products, concepts, ICT and logistic improvements are developed there. At Arena level the importance of R&D can be divided broadly into 10% product development, 50% new shop concepts and 40% ICT/logistics. Market leaders Albert Heijn (the Netherlands) and ICA (Sweden) are the foremost examples. Their successful innovations will diffuse into other parts of the Ahold organisation. The remainder of Ahold's R&D (10%) is centralised and performed by (several) dozens of employees. At corporate level there is no development of new shop concepts, the R&D efforts are allocated for 20% to new product development and 80% to the development and implementation of new ICT systems and logistic solutions. Less developed parts within the arenas are picked up at corporate level. Criteria (to be formalised) for the development of innovations or projects at the centre are: (1) requirement of economies of scale, (2) requirement of a certain level of standardisation and (3) distribution requirements, such as exchanging ideas and managing knowledge flows between the arenas. At the corporate level the first moves in facilitating the synergy between the relative autonomous arenas are taken mainly by the Ahold Leadership Team (ALT) and the Business Support Office (BSO). To conclude the organisational arrangements we point out that Ahold's historically developed decentralised approach entails, besides advantages (regional specific, more creativity) also disadvantages in terms of efficiency and speed. The strength and efficiency of Ahold's competitors, such as Wal Mart is partly thanks to their central and hierarchical organisation. Ahold needs four persons, whereas WalMart only needs one to get the same things done. However, their market strength makes it possible to impose their preferences (and e.g. set the standards) at their suppliers and thus reinforce the efficiency gains.

Cosmopolites play an important role in Rabobank services' R&D and innovation process

Services R&D can be found in multiple places within the Rabobank organisation. Basically innovations are being pushed by actors who are conceptualised in social network analysis as cosmopolites. *Cosmopolites* are persons who have creative new ideas, act like a kind of free agent within the organisation, are part of extensive networks outside the Rabo organisation with strong ties to (technology) providers and universities, as well as with market parties, local banks and with strategic key informants within the central Rabobank. *Cosmopolites* are consulted and approached by start ups and others to invest in new concepts and technologies. Based on these proposals the cosmopolites develop new service concepts. In order to develop these concepts further, cosmopolites by pass the regular decision making processes, and make use of their network to find funding and marketing support, inside or outside the Rabo organisation. An example is the smart partnership between Radio 538 and Rabobank in promoting MiniTix, a micro payment concept. Radio 538 makes use of MiniTix for the payment of downloading ringtones, while Rabobank wanted to promote the MiniTix concept. Cosmopolites act as intrapreneurs within the Rabo-organisation. After a successful pilot the project can gain formal status within the Rabobank.

3.6 Decision-making on R&D activities

Decision-making on R&D activities was another topic area of the investigation. The first question addressed whether or not there was a long-term R&D strategy for services at company-management level. It turned out that less than a third of the survey companies can point to such a strategy. Furthermore, a few other companies state that although there is no clear R&D strategy, R&D projects are under the control of top management. In all the other companies the answer to the R&D strategy question is No even though most of these firms appreciate the necessity for such a strategy.

Another question dealt with decision-making on new services' R&D projects. Responses revealed the following six different situations:

- as part of the wider overall R&D strategy and budget cycle (in most of the interviewed hybrid firms),
- a form of dedicated portfolio management,
- decision-making by committees or by the most involved departmental heads,
- on a case-by-case basis (e.g. sound business cases),
- priorities of clients (most visible in KIBS that are mostly client-led),
- development of new ideas under the radar of senior management.

There was mostly some mechanism for joint decision-making on priorities concerning services' R&D, but not necessarily at highest management levels. Also decision-making on a case-by-case basis was quite prevalent, leaving considerable freedom for professionals dealing with service innovation. Sometimes the role of entrepreneurial employees or free agents was seen as a key. However, scope for playing around and really experimenting varied considerably (as customers need to be involved).

Hardly any company was able to provide detailed information to another question concerning exact budgets for Research and Development of services. These budgets are clearly defined in only extremely few cases and, as a rule, are allocated from one project to the next. Consequently, overarching control of services' R&D activities is inadequate overall. Only in rare cases are investments in services' R&D evaluated and conclusions drawn for future R&D activities.

Although defined service R&D strategies, budgets and organisations are lacking in most cases thus far, there definitely is a trend or need to formalise these and plan, manage and budget services' R&D in a more structured way. This pattern is most visible in hybrid firms and KIBS.

BOX 3.4: DECISION-MAKING ON R&D ACTIVITIES

Decision-making on Rabobank's R&D activities - shift from a business-centric to a customer centric view.

Proposal for innovative hard or soft R&D projects are judged as any other project. There are some budgets available for out of pockets costs or projects for the innovations groups, which are specifically made available for innovative projects. The Board of Executives of Rabobank keeps a distance, which make it possible for employees to work on innovative projects that are not under direct control of the Board (see the paragraphs on cosmopolites). There is no direct régie from the board of directors or an active interest in service innovation. Decisions on projects are made every six months when portfolios are defined. It is important that projects are supported by local banks or other business units. Basically funding of projects is based on a 50-50 basis (marketing and IT). Half of the funding is provide by the innovation team within ICT group, half by marketing, local banks or interested business unit. An important criterion is fit with the core strategy of the Rabobank, i.e. a focus on customer value. The shift from a business-centric to a customer centric view implied a complete overhaul of the organisation from procedures, systems and processes to the mindset, behavioural skills and attitudes of employees. Rabobank will always look at customer value first. Technical conditions and the business case are important criteria as well.

Managing worldwide R&D strategy at SANTANDER Group

The Santander Group has established a Global Committee of New Products that supervises the features of the new products and services and whether they are technically consistent, legally correct and adapted to the profile and real needs of the group's clients. It supervises the new products and services launched by the group's institutions in the whole world. It was created in 1999 and during 2003 it reviewed 96 products or families of products. In the Global Committee of New Products, 17 business units of the corporation participate in a permanent way. If the product or service is trying to be commercialised in a country different from Spain, it has to be approved by the Local Committee of New Products prior to the approval by the Global Committee. This Local Committee is structured in a similar way to the Global Committee and it previously analyses all the R&D proposals. The hallmark of Santander's products and services are innovation and profound knowledge of local markets.

3.7 Formalisation of R&D

Besides questions regarding strategy and the anchoring of services' R&D through organisational measures, the shaping of R&D processes for services is another area of action in practice. Wherever possible, companies that regularly develop new services try to make their R&D processes transparent and reproducible, avoid duplication of work, prevent mistakes that have already been made being repeated and recycle existing knowledge. Furthermore, the quality and the market success of new services must be ensured, as far as possible, by means of defined processes.

In order to achieve this, efforts have begun to describe R&D processes and to standardise individual R&D tasks to a certain degree. This "formalisation" of services' R&D ranges from fixed preset processes on one hand to flexible, situation-specific procedures on the other hand. Where the term "formalisation" is used below, under no circumstances should this be interpreted as R&D processes being squeezed into a rigid straitjacket. The term should rather be construed as meaning that development processes are no longer generally haphazard and that there are defined guidelines in accordance with which Research and Development for services is conducted.

In the context of the study, the companies were asked to what extent they had already defined and documented their R&D processes. Their responses can be divided into three different groups. First group of companies uses virtually no set guidelines for developing

services and includes slightly more than one third of the surveyed companies. In these companies, new services come into being mostly on an ad hoc basis or at the initiative of individual employees. In the best case, people resort to general Project Management rules in order to shape the development workflow.

In the second group which includes the majority of the companies surveyed, development of services follows predefined workflows but is often documented only in rudimentary fashion. There is more or less extensive experience from previous development projects and knowledge is stored only in the heads of the responsible employees. In addition, initial R&D methods are used to develop new services. Methods mentioned include portfolio management, trend analysis, scenario analysis, SWOT Analysis, Quality Function Deployment (QFD), Failure Measurement and Effects Analysis (FMEA) and Service Productisation, with the greatest importance apparently being given to a systematic portfolio management (this is used by roughly a third of the surveyed companies).

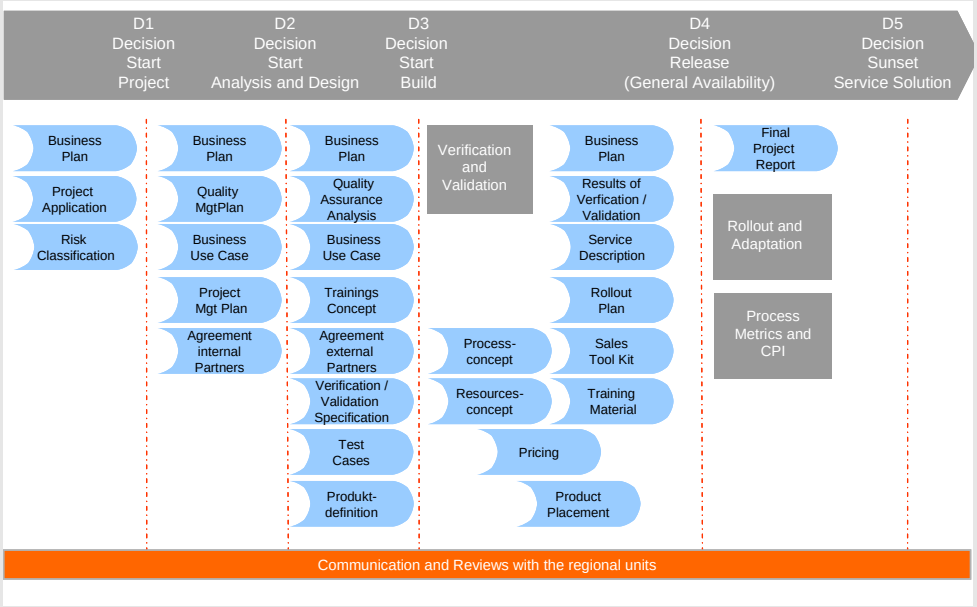
The last group of interviewed companies, admittedly small, consisting of just three firms, had definitively defined and comprehensively documented their R&D processes in writing. Detailed specifications and guidelines for the development of new services were worked out for this purpose. Above all, this has the advantage that knowledge of service development is available across all involved employees rather than being confined to individual experts. As far as the structure of R&D processes was concerned, it was interesting that the latter were patterned on familiar product development processes (e.g. stage gate model) which suggests that - at least in principle - product development procedures are transferable to the development of new services.

It was also striking that all surveyed companies had recently started to formalise their services' R&D more and, as a rule, were unable to claim many years of experience in this field. Also, some of the companies that had previously had no documented R&D processes stated that they were currently working on greater formalisation.

BOX 3.5: TREND TOWARDS FORMALISATION

Service Engineering Process by Siemens Medical Solutions

Regarding the development of services, the corresponding process of Siemens Medical Solutions is fixed in a so-called service engineering process. An example of this process with activities and milestones is shown in the figure below.



Using the funnel concept and portfolio management at Randstad

Randstad Group uses the well-known funnel concept in combination with portfolio management to organise the 'R&D and innovation' process. Using a funnel concept to first collect business opportunities and good ideas, and gradually reduce them by using a set of criteria is quite common in manufacturing R&D, but less so in services. At Randstad the following steps are used:

- Identify HR-related opportunities by scanning the market and by collecting good ideas spread over the Randstad organisation;
- Assess how profitable such an opportunity might be (also by judging whether it is a one-off opportunity or something that can be scaled up), how it can be organised, what the chances are for success or the risks involved, and whether the organisation can handle it;
- Assess the basic specifications of a new service or process i.e. make a business case in terms of organisation, financial means and number of staff needed;
- Test the new concept or process in a pilot project, preferably with clients and at several different locations;
- If these pilots prove successful, describe them in detail (toolkit approach), and;
- Roll-out of the concept or improved process over the relevant countries where such services are offered i.e. declare them as the standard for this type of service;
- If necessary, adapt to the local context and culture.

At the level of the executive board of directors portfolio management is used to monitor and decide on a portfolio of innovative projects that typically contain 10-20 projects ranging from incremental process innovations to completely new service concepts. So a decision at the level of board of directors can result in massifying a new concept. For some mass-customised services mass is important, for specialties it is usually higher revenues per employee that matters.

3.8 R&D cooperation

Cooperation with external partners plays an important role for almost all the surveyed companies. In fact an open collaborative network model seems to be the standard for services' R&D. The most important partners are customers that cooperate in R&D projects as lead users or development partners. Suppliers, ICT companies and consultants are mentioned frequently. To these must be added market researchers, sales partners, external experts, associations etc.

Is nevertheless surprising that there is no distinctive cooperation with universities and scientific establishments the companies surveyed. These are regarded as suitable places for talent scouting and personnel recruitment or as partners for creating an innovation culture but are seldom integrated in concrete R&D projects. The surveyed companies responded to the question concerning reasons by citing insufficient practical relevance, an excessively abstract method of working, a strong focus on manufacturing and technologies and a "lack of innovative drive". At the same time, many of the companies nevertheless claimed they were interested in closer cooperation.

At this point it is worth mentioning the observation that in the case of some of the surveyed service companies, KIBS assume the role that many research establishments play in the case of producing companies. They are often used as knowledge brokers and innovation intermediaries.

BOX 3.6: R&D COOPERATION

Client-driven R&D cooperation at Roke Manor Research

Founded in 1956 Roke Manor Research Limited is now owned by Siemens, but remains an autonomous operation. Roke Manor employed 404 people in 2004, of which 330 are professional engineers and scientists, at its base in Romsey in Hampshire in the UK. A large proportion of the R&D undertaken by Roke Manor Research involves close collaboration with its clients. Co-innovation is very common in this mode of operation, whilst clients increasingly require complete solutions to their problems. Thus, customers often require total business solutions as well as niche products, one of the changes has been to develop a systems engineering capability to provide an end-to-end service. Roke Manor Research is now offering its customers a continuous capability, from requirements capture and business planning through to delivery of their product, technology or service. In addition to working closely on specific innovation projects on a one-to-one basis with single clients, Roke Manor Research can also acts as innovation intermediary with a wider set of firms and organisations (including government departments). The company is seen as being particularly well-connected and can be characterised as a 'hub' in a number of innovation network, via its work on 3G for example, bring together companies and individuals with specialist and complementary capabilities. There is also the issue 'coopetition'; some of RMR's clients on some projects are also its competitors on other projects. This can cause considerable problems. Roke Manor Research is obviously closely linked with its clients' research departments. However, formal connections with the science-base are relatively weak and Higher Educational Institutions (HEIs) are viewed primarily as a source of skilled labour.

Linkages and collaboration for R&D at Océ

Océ is mostly known as one of the major R&D performing manufacturing companies and as such cooperates with other businesses, universities and other research organisations. However, in the area of services R&D there is much less cooperation yet with other companies, universities and research organisations, though some cooperation with other companies exists. Interview partners at Océ indicated that they would like to learn more from and share experiences with similar industrial companies and more specifically companies from capital goods industries, with medium sized production runs and an important service component e.g. manufacturers of medical equipment and service industries that provide secondary or facilitating/enabling service functions to other industries. Océ would like to strengthen cooperation with firms that dispose of the necessary process and business knowledge and the creation of a Community of Interest/Practice was seen as helpful.

Additionally, there certainly is an interest in working more closely with universities and other research organisations. One of the problems mentioned in the cooperation – on services and services R&D - with the knowledge infrastructure is that there are only a few individuals at best that have relevant knowledge. In terms of education it was observed that Océ has too few knowledge workers with an understanding of service innovation.

Rabobank R&D cooperation: not only investor but also co-innovator and knowledge provider

The Rabobank sees its own role not solely as investor in knowledge intensive projects, but also as a knowledge provider, with regard to financial services and industry sectors, but also with regard to organizational processes, customer orientation and new technologies. Rabobank wants to share its knowledge with its customers and government. Rabobank uses instruments, like Stichting Ondernemersklankbordgroep, Nederlandse Vereniging Algemene Toelevering and Rabo Development program, to share knowledge. Only in a limited number of cases *clients* are involve in service innovations at Rabobank. In pilots employees are most of the time involved in pilots. Co-innovation mainly takes place between individual Rabobank employees, i.e. the cosmopolites, in conjoint with suppliers and actors in their network. For instance mobile service points were developed with Logica CMG and Mobile outlook with KPN Telecom, hardware provider Compaq (HP) and software provider Fenestrae. Rabobank is involved in research as differs as analphabetism issues in the Netherlands and worldwide water management. On a local level Rabobank initiate studies together with local municipalities on local economic developments. Individual employees that are part of the innovation network within the Rabobank, have close contact with universities. This type of collaboration has an ad hoc nature and is not part of official policies of the Rabobank group. There are some part time positions created at universities and funded by the Rabobank. However there isn't a clear focus on service innovation.

3.9 Participation in publicly funded R&D programmes

Another topic area of great interest in the investigation dealt with the participation of business-related service firms in publicly funded R&D programmes. Both national programmes as well as programmes financed by the EU were taken into consideration.

Roughly half of the companies claimed they had already participated in correspondingly funded R&D projects, but the number and scope of the projects did vary enormously. Only approximately a quarter of the companies are regularly involved in promotion projects in terms of significant capacity. In many major companies, the interviewees – who were, after all, predominantly persons responsible for R&D – were unable or found it difficult to cite examples of such R&D projects, a fact that underscores the hitherto subordinate role of this type of R&D support.

This observation is emphasised further still by the fact that the majority of companies do not even know the national funding opportunities and EU programmes that are relevant to them. It must nevertheless be added that the companies are not actively looking for such opportunities or funding. By way of example, in the case studies there was hardly a single company that had created responsibilities and infrastructure to facilitate systematic acquisition of funding or to lobby funding providers - in contrast to manufacturing companies where this is often the case.

The surveyed companies made the following statements in response to the question regarding their overall inadequate participation in existing promotion programs:

- Promotion opportunities are not transparent to many of the companies ("promotion jungle") and obtaining information about programmes is regarded as an onerous process.

- The contents of programmes are insufficiently geared towards the needs of service companies (in fact almost all of the example projects mentioned by the companies have a strong technological bias).
- The application processes are described as too bureaucratic, too costly and too time-consuming. There are also sometimes reservations regarding the participation of service-only companies in research projects.

Overall, it appears that the opportunities provided by funding providers are still insufficiently tailored to match the needs of service providers. On the other hand, there is undoubtedly room for improving the ability and willingness of companies to participate in R&D programmes.

BOX 3.7: PARTICIPATION IN PUBLICLY FUNDED R&D PROGRAMMES

The example of TELEFÓNICA I+D

Telefónica is the first company of Spain and the second operator of Europe participating in European projects. Telefónica I+D constitutes the first center of R&D of telecommunications by participating in projects of the VI Framework Program of the European Union. In addition, it contributes to the European initiatives of innovation, in the VII Framework Programme and in the new R&D projects (the Programme of Technologies for the Society of the Information -Programme IST-) and structural transformation of the European Commission, within the frame of Europe 2010. Conscious that the innovating effort is more efficient when made in accordance with the surroundings than in an isolated way, Telefónica I+D considers strategic to be present in Europe, participating in the definition of the investigation strategies and in whichever projects of interest that are sent from Brussels. This allows, in addition, the maintenance of a close contact with universities, national and international research centers and other companies. From 1988, Telefónica I+D has participated in all the Framework Programmes and the main integrated R&D projects co-financed by the EU. At the moment, it participates in 55 European projects and acts as leader and coordinator of six of them (four of VI Framework Programme). This collaboration implies the dedication of more than 228 people/year in the period 2004-2008 and a budget of 28,32 million euros. It has been provided with 16 million euros in subventions approximately, which represents 53% of the resources that each R&D project needs.

3.10 Policy issues

Quite a few of the firms involved in the study do not have explicit policy suggestions as how to facilitate services' R&D. Some of them (even some of the large service firms) do not seem to be – whether intentionally or unintentionally – well connected to the R&D and innovation policy scene.

The interviewed companies were asked to suggest their recommendations for a future R&D promotion policy. Most policy suggestions have a rather general flavour and, to a large extent, are about non-innovation policies that better suit the needs of service firms (which might effect innovation considerably) such as:

- importance of educating and training service professionals with the right set of skills and mindset,
- need to have a fundamental debate about (future) changes in the service sector,
- better use public procurement policies to spur innovation in services,
- need to increase framework conditions for entrepreneurship and innovation in general,
- need to work on an innovation culture society-wide and in service firms as well,

- importance of legislation and regulation (both too much as well as to trigger new regulation for the development of service markets) such as in relation to health-care, safety, etc.

Some other services' R&D and innovation-specific policy suggestions include:

- creation of open innovation culture in service firms requiring open management style,
- scope for developing service competence centres within the public knowledge infrastructure,
- need to develop frameworks and methods for developing innovative services,
- create platform of practitioners in services innovation,
- support for intersectoral exchange of good practices.

If there are comments on R&D and innovation programmes, the need to do the following was flagged up:

- define services' R&D better,
- make existing R&D programmes more accessible to service innovators and provide better information on R&D programmes and the way service innovators can participate,
- increase the scope in the EU to deliberately cooperate in services' R&D and create national and European forums for services' R&D.

BOX 3.8: POLICY ISSUES

METRO's experiences with public R&D programmes.

The METRO Group submitted the following suggestions within the framework of the case study:

- Politics and research promotion agencies should have a more distinct perception of the service-sector industries. So far, research promotion is strongly oriented towards traditional large scale industries (e.g. automotive and pharmaceutical industries). Programmes and processes should be adjusted to the needs of service providers.
- More efficient processes within the funding organisations are desirable. The application phases involve too much effort and take too long. Especially with the short innovation cycles of many service providers, the official project launch is often too late. There is also criticism about the difficulty of procuring information on the eligibility of issues ("subsidy jungle") and the accounting processes and review methods are considered to be out of time.
- Commerce and logistics constitute the largest economic block in Europe as measured by the employment figures. At the same time, there is a lack of competent contact persons at the EU for the recognition and advancement of new commercial issues. METRO sees a significant need for promotion especially for issues such as "RFID for Commerce".

The criticism expressed about public research promotion refers particularly to tedious processes and incomprehensible cuts in budgets in the application phase. However, it is also noted that commerce should increase its presence with the funding organisations and reinforce its lobbying activities.

The importance of an 'open' innovation culture and learning organisations as flagged by Randstad

Two items are regarded as relatively more important for creating innovative service enterprises. In the first place the creation of an open innovation culture in service enterprises. Randstad itself steers on an open entrepreneurial culture, where people at all levels can put forward suggestions. Randstad

representatives remarked that the heart of the organisation is in the sort of soft values such as openness. Promising ideas for renewal are accommodated and not dependent on a fixed innovation agenda. When discussing options for innovation policies that are favourable to service industries it is indicated that government could contribute to creating a more favourable open innovation culture. The second item on which government could contribute to innovation in service enterprises such as Randstad is in creating learning organisations. How to best create a culture (again) in which service professionals are willing to cooperate and share new insights and knowledge. A firm such as Randstad – which increasingly sells knowledge-intensive business services e.g. HR solutions - is in need of more and more employees with consultancy skills. They should be trained and become accustomed to sharing knowledge, not only with clients, but also among themselves. This also has implications for education and training in general.

3.11 How valid are the results of the case studies?

The RENESER cases have delivered a number of informative results on services' R&D. However, it has to be pointed out, that the study does not have a representative character. On the one hand the sample of 21 cases is too small to provide results that could be generalised. On the other hand the selection of the individual enterprises took place in particular regarding experiences with services' R&D and less regarding criteria such as size, sector and nationality.

With the study, above all the objective was pursued of uncovering and of discussing interesting solutions within the area of services' R&D. It supplies thus important detail results, which would have been hardly possible with quantitative empirical investigations. An example is the determination and the discussion of the extent of "hidden R&D" within the interviewed companies. Only by the methodology of personal interviews an exact picture could be drawn here, which with a simple questionnaire would not have been possible.

A comparison with former empirical studies on services' R&D shows however a high degree of similar results. In particular there is an overlap of the following basic results:

Service companies do perform R&D:

All the examined service enterprises perform services' R&D, whereby the range and the intensity of the R&D activities vary strongly. Since the 80's there is an increasing number of publications in the scientific literature as well. Extensive reviews of literature can be found in Bowers (1985) and in Johne and Storey (1998). Significant R&D activities are in particular reported from financial service providers (e.g. Jochims 2002, Schneider 1999) and ICT service companies (e.g. Fähnrich and van Husen 2004, Meiren and Nägele 2002).

Trend towards a formalisation of R&D:

Early publications are full of statements like „new services happen" rather than formally developed (Rathmell 1974), „we have yet to hear of service designers" (Gummesson 1989) or the belief that new services happen as a result of "intuition, flair and luck" (Langeard et al. 1986). Also most of the interviewed enterprises have no long tradition in the systematic execution of services' R&D, but they definitely intensified und structured their efforts within the last years. This concerns in particular the clarification of responsibilities, the supply of budgets for R&D projects, the creation of an appropriate organisational infrastructure and the definition of R&D processes. Similar observations are described in the studies by Meiren (2006c), by Spath and Zahn (2003) as well as by Edgett (1996). Moreover, some former studies also point out a correlation between formalisation of R&D and success (e.g. Fähnrich 1999, de Brentani 1995, Martin and Horne 1992).

Lack of dedicated R&D strategies:

Although many enterprises begin to systematise its services' R&D, deficits in the formulation of explicit R&D strategies could be observed again and again in the cases – frequently in connection with a lack of consciousness and unsettled competencies in the top management. This often results in parallel running activities and a high extent of "hidden R&D". Also in some empirical studies this situation is described (e.g. Luczak 2003, Fähnrich 1999, Griffin 1997).

Altogether it remains to be noted, that the RENESER cases cannot be regarded as representative, but their essential results are in line with former empirical studies. Thus the case study accomplished in the project has been a suitable instrument, in order to get more detailed insights into individual enterprises and thus to complement the results from former quantitative empirical studies.

3.12 Summary of case study results

Overall, and in summary the following generalisations can be made on the basis of the 21 case studies performed:

1. Most service firms show some form of structured attention for services' R&D, however services' R&D is mostly less formalised, more distributed, less explicitly managed and funded.
2. Increasing competitiveness and customer needs are important drivers for services' R&D.
3. A dedicated long-term services' R&D and Innovation strategy (and hence management) at the level of the board of management is rare. Formalised approaches for deriving services' R&D strategies are limited.
4. Some service firm show high levels of technological R&D as well as technology-enabled innovation besides service delivery and organisational innovation.
5. Formalised, service-only R&D is the exception rather than the rule. However, in practice important services' R&D activities are hidden behind labels such as business development, service improvement, etc., without being recognised as services' R&D. A lot of services' R&D is also hidden in client-specific solutions.
6. In only about half of the cases were more formal methods for managing services' R&D and innovation portfolios used and at the project level about half of the firms involved also used more formalised (mostly rudimentary models) for new service development.
7. Although open models of innovation feature quite prominently in most cases, there is considerable room to improve R&D collaboration between service firms and research organisations. Cooperation on services' R&D is mostly poorly developed.
8. Most large service firms are not well connected to the R&D and innovation policy scene (apart from the few of them that perform extensive technological R&D themselves).
9. Existing R&D schemes are of limited value to most service firms and most of them find it hard or unappealing to get access to or participate in them. At the same time, nearly all the analysed companies do not have an internal structure for supporting the systematic acquisition of funded R&D projects.

10. There is a whole array of innovation and non-innovation policies that could help service firms become more innovative and eventually more competitive.
11. There is huge potential for cross-firm and cross-industry (lateral) learning.
12. Creating an innovation culture suited to services' R&D and innovation (in firms, in industries, society-wide) is seen as the key to successfully growing competitiveness through services' R&D and innovation.

4 Is the perceived R&D deficit of individual European BR service firms real?

4.1 Introduction

Services R&D is key for meeting the Lisbon goal of investing 3% of GDP in the EU in R&D by 2010. If the contribution that services at large – representing the major part of the economy – already provide and more importantly can potentially provide in the near future in reaching the 3% goal is not recognized, not measured adequately and not facilitated the 3% goal will remain a fallacy. We therefore have to improve our knowledge on the actual R&D performed in services in general and in business related services in particular as these are thought to propel innovation in client industries. Do we have a clear picture of the R&D intensities in these services? Are we capable of adequately measuring services' R&D? To what degree does services' R&D lead to productivity increases and hence improved competitiveness? Do we miss important complementary non R&D investments in innovation?

In this chapter we elaborate on one of two key issues addressed in RENESER i.e.: "Is the perceived R&D deficit of individual European BR service firms real?". "And if so, why (and to what degree) is the R&D performance of business-related services in the EU lagging behind other (mainly) manufacturing industries and the US?" These are difficult questions which cannot be answered with a simple yes or no, because there is a huge variation between countries, national statistical agencies, industries (as well as within industries) in this regard. Further, this question is hard to answer more definitively as services' R&D and innovation is most likely underreported and notoriously hard to measure for various reasons. Although important, services R&D is more than just a measurement problem. By relaxing the quite strict definition of technological R&D, reaching the Lisbon R&D targets would already be a somewhat more attainable target. However, as is evident from the RENESER case studies in business-related services, there are all sorts of R&D-like and innovation-related (from complementary to pure technological R&D) activities that play a key role in making these firms innovative and eventually competitive that are not observed in regular R&D and innovation statistics. It can therefore be doubted whether focusing in on services' R&D alone is that productive, as simply increasing the technological R&D expenditures of business related services activities might not result in the final goal of increasing the overall innovativeness and competitiveness of the EU economy at large.

In this chapter we first deal with the 'big picture' with regard to private expenditures on R&D in service industries and their growth rates (section 4.2). Subsequently we review some of the major discussion points regarding services R&D and its measurement (section 4.3). We proceed by focusing in on some business-related services and consider their likeliness to engage in R&D and innovation: the discussion draws together some of the main messages derived from our set of case studies (section 4.4). Towards the end of the chapter we deal with two special cases of business-related services that go unnoticed in most discussion on services R&D i.e. R&D services and service R&D as performed by manufacturing firms. R&D services is a BR service category that is growing in importance and may especially help both manufacturing and service firms with their R&D and as such

is an atypical service industry (section 4.5). A lot of the underreporting of services R&D can also possibly be related to the fact that much of the service R&D actually goes on in what still are perceived to be product-based or manufacturing firms whereas quite a number of these firms have developed into what we have labelled as hybrid firms with considerable service activities and increasingly so dedicated services R&D (section 4.6). Finally we address the question raised in the title of this chapter, namely "Is the perceived R&D deficit of individual European BR service firms real?" (section 4.7).

4.2 The big picture on services R&D[18]

Innovation is traditionally associated with manufacturing, where R&D plays an important role. Apparently, this fact has led to some distortion when measuring services sector innovation activity (Gallouj and Weinstein, 1997; Evangelista and Sirilli, 1995). As innovation in services is more *organisational* in character and has a more disembodied nature (i.e. is not necessarily embodied in products, machinery, technology or technical artefacts), the standard innovation and R&D measures seem to miss much of the innovation that is taking place (de Laat, Callon and Laredo, 1997). However, despite the fact that the services sector in general relies less on R&D for innovation, R&D is still an important input into the innovation process in service firms and industries. Services' sector R&D intensities are on the rise and R&D is a factor in the innovation process in service firms and industries.

The relatively limited importance of R&D in services (as compared with its importance in manufacturing) can also be deduced from the data included in table 4.1. The United States shows the highest level of services R&D intensity, and in some of the larger European economies, such as Germany or France, intensity is notably lower. Table 4.1 also highlights the substantial role that services' R&D plays in the Scandinavian region. Further, the table highlights the huge differences between countries in service sector R&D which apparently cannot be explained by differences in sector structure - i.e. specialisation in service industries that are more likely to engage in technological R&D - as these differences are simply too large. A combination of different levels of outsourcing (and hence differences in specialisation), abilities between industries and also between industries in individual countries to absorb new ICTs and subsequently use these as a basis for developing innovative services as well as levels of underreporting of technological R&D in services are most likely responsible for this variation. Possibly the representation of large service firms performing relatively more technological R&D can be of influence as well. However, this seems at odds at first glance with the ranking of large European countries such as Germany, France, the UK and Spain that all have major service firms as well as a country like the Netherlands that also feature some large services multinationals. Finally, the pure labelling of services R&D in especially hybrid firm may play an important role as well. The well known example is the re-labelling of IBM from a manufacturing to a service firm in US R&D statistics.

R&D in the manufacturing sector represents around 75% and 80% of total business R&D intensity, while in the case of services R&D, this share is close to 20% and 25%. In spite of this statement, some services, for example, telecommunications, software development and R&D services, have an important R&D intensity in the economy. In this respect, annual growth rates of business R&D expenditures have risen more swiftly in services than in manufacturing firms between 1995 and 2003 (see table 4.2). In the services sector R&D increased on average 12,1% per annum over the period 1995-2003**,** whereas the similar

[18] This section to an important degree draws on Rubalcaba & Gallego (2006).

figure for the manufacturing sector amounted to approximately 3%. As can be seen in table 4.2 the high figure for services at large is largely due to a substantial increase of R&D intensity in business services, particularly in computing services. The latter grew annually in the period at a rate of more than 17% on average for all countries. This table does not provide a comprehensive picture for all business-related services – financial services are for example missing and within business services considerable differences may still be present – but again shows a wide variety. Computing services show annual growth figures over the period 1995-2003 of more than 30% in Germany and Ireland but show far more modest growth rates in countries such as the UK, Australia and Canada. Growth rates in the distributive trades and transport & communications are even more dispersed and in some countries even negative. This high – sometimes at random variety it seems – cannot be directly explained by real economic developments, but is seriously affected by the unevenness at which factors such as outsourcing, underreporting and ICT adoption and in general growth from a fairly low base affect the R&D figures here. This would require more detailed analyses of these individual factors and indeed individual industries. Unfortunately more disaggregated figures from the United States are lacking here, but it seems that at least a couple of EU-countries show higher growth rates than the US, although mostly from a smaller base.

Table 4.1:" R&D intensity in added value, 2001 (%)

Ranking services	Country or group	Total economy	Total services	Manufacturing	Services / Total	Services / Manufacturing
1	United States	2	0,9	8,5	45,0	10,6
2	Denmark	1,6	0,9	6,0	56,3	15,0
3	Norway	1	0,7	4,1	70,0	17,1
4	Sweden	3,7	0,6	15,7	16,2	3,8
5	G07	1,8	0,6	7,6	33,3	7,9
6	Finland	2,7	0,5	9,4	18,5	5,3
7	Korea	2,2	0,5	6,0	22,7	8,3
8	OECD	1,7	0,5	7,2	29,4	6,9
9	Czech Rep.	0,9	0,5	2,1	55,6	23,8
10	UK	1,4	0,4	6,6	28,6	6,1
11	Canada	1,1	0,4	4,1	36,4	9,8
12	Ireland	1	0,4	2,2	40,0	18,2
13	Australia	0,8	0,4	3,3	50,0	12,1
14	Belgium	1,7	0,3	7,7	17,6	3,9
15	Netherlands	1,2	0,3	5,6	25,0	5,4
16	Spain	0,5	0,3	1,8	60,0	16,7
17	Japan	2,2	0,2	9,9	9,1	2,0
18	Germany	1,9	0,2	7,7	10,5	2,6
19	France	1,5	0,2	6,9	13,3	2,9
20	EUR9	1,3	0,2	5,7	15,4	3,5
21	Italia	0,6	0,2	2,4	33,3	8,3

Source: Based on ANBERD and STAN database, OECD.

In chapter 2 we already reported similar findings. There we observed *inter alia* that:

- Services' reported R&D is growing rapidly, although recorded levels of R&D are still much lower for services than for manufacturing, especially for non-technology-based services;
- Service-sector R&D varies considerably across sub sectors;
- R&D is highly concentrated geographically, by sector and in a few giant firms, making services R&D statistics extremely vulnerable especially as to misallocation of services R&D as performed in hybrid firms;
- Overall, service firms are less likely to engage directly in R&D as part of their innovation activities than are manufacturing firms. However, service firms do engage in formal R&D and this accounts for a sizable proportion of their total investment in innovation activities;
- The issue of underreporting of R&D in services is real (for various reasons, see section 5.3).

Table 4.2: Annual internal business expenditure on R&D growth rates, 1995-2003 (%)

	Total	Manufact	Total services	Business Services	Computing Services	Distributive Trade	Transport & Comunict
Australia	4,0	1,7	7,3	7,2	6,4	-2,7	8,2
Belgium	3,1	:	:	:	:	:	:
Canada	3,8	3,5	5,1	8,2	7,5	-0,1	-1,8
Czech Rep.	4,6	2,4	10,2	7,8	:	:	:
Denmark	9,0	7,3	12,1	:	14,9	-4,2	24,2
Finland	10,3	9,9	12,7	14,1	20,8	18,7	6,7
France	2,0	:	:	:	:	:	:
Germany	3,8	3,2	14,7	16,0	30,4	11,2	10,9
Greece	7,0	8,9	6,3	9,0	12,9	-10,1	23,1
Hungary	4,9	5,0	23,6	25,6	28,3	52,3	-9,3
Iceland	17,7	10,7	25,2	28,6	14,1	:	12,0
Ireland	6,3	1,7	23,6	30,5	31,8	28,5	-9,7
Italia	1,9	0,0	12,5	10,2	14,7	33,6	7,8
Japan	3,7	2,6	21,7	:	:	:	6,6
Korea	6,1	6,4	8,3	:	:	:	:
The Netherlands	2,7	2,1	7,3	11,7	22,9	5,5	-17,2
New Zeeland	11,0	2,9	22,0	23,5	:	14,3	35,4
Norway	4,3	3,8	4,6	5,5	13,8	3,4	-0,7
Poland	-2,3	-3,2	-1,2	-8,9	19,6	-44,8	4,7
Portugal	12,2	7,6	19,8	24,0	29,0	27,1	-6,2
Slovakia	-1,7	-5,0	0,7	0,5	:	:	:
Spain	8,6	3,8	23,6	25,2	17,3	45,0	8,9
Sweden	4,7	4,1	7,0	8,1	19,1	11,5	-36,6
United Kingdom	2,4	2,2	:	:	5,7	:	:
United States	3,9	:	:	:	:	:	:
Average	**4,3**	**3,3**	**12,1**	**10,9**	**17,3**	**11,4**	**6,6**

Source: Based on ANBERD database, OECD.

As Miles et al. (2006) have pointed out this leads to the question of whether the reported growth in technological R&D in services at large and in some business-related service industries in particular is a real increase in services' R&D or not? They notice that "innovative effort is liable to increase, and some of this will take the form of R&D. Increased technology-intensity in many services is likely to promote increased R&D of the traditional, technology-related kind, and this should be captured in statistics. There is reason to think that this lies behind some of the recorded increases in services R&D, though the increases also reflect (a) outsourcing of R&D, (b) the growth of technology-related services whose R&D-intensities are very high, and (c) improved coverage of services' R&D…" These are parallel processes which in practice are hard to separate.

Further, we still need more insight into how R&D expenditures and innovativeness and eventually competitiveness are linked. As for manufacturing there is quite likely a positive relationship, but this at the same time seems to tell only part of the story for two principal reasons. Innovation success in services is in the first place possibly even more so than in manufacturing dependent on other type of expenditures that result in successful organisations that are capable in adapting to changing circumstances such as expenditures on training, marketing, human resources management, ability to establish and sustain a link with clients and more generally the ability to create truly learning organisations. Secondly, performing technological R&D is not an option for all firms (this accounts for both manufacturing and service firms). Some firms have no strategic intent to become an innovation leader or technologically most advanced firm in the market or they simply lack the required capabilities. They might be better off adopting an fast follower or imitation strategy to perform (and sometimes even to absorb the results of) technological R&D. Approximately 75% of the RENESER cases in business related services are examples of mostly large service activities that are capable of performing technological R&D themselves or at least absorb the fruits of technological R&D performed elsewhere and transform these in competitive service offers. Therefore more econometric type of analyses are needed to see how the propensity to engage in technological R&D in services in general and business-related service firms in particular relates to innovation performance and eventually firm performance. Such analyses would by definition also cover more low profile service firms and SMEs.

Miles et al. (2006) further noted a number of measurement issues regarding services' R&D that make that services R&D statistics are notoriously hard to interpret. Some of these issues are treated briefly in the next section.

4.3 Major issues regarding measuring services R&D

As a recent European Commission (2005, p. 37) position paper noted "The increasing importance of services sector R&D is mainly due to three factors: an improvement in the measurement of services sector R&D; a growth in R&D intensity in the services sectors and an increase in the outsourcing of R&D by both the business and government sectors." In this section we deal with the first issue in relation to services in general i.e. not necessarily limited to business-related services. Measurement of services R&D is beset with problems, basically as the proxy technological R&D is used for measuring innovation. This proxy was largely developed for measuring technological R&D in manufacturing. The current measurement issues regarding services R&D can be traced back to the services low tech heritage (1), the ignorance as to some of innovation specificities of service firms or invisibility or lower levels of formalization of R&D (2) and the resulting underreporting of R&D in services (3). The latter has to do with the first two points, but also with issues

regarding definitions of R&D as used in surveys and for example R&D tax credit schemes and the ways in which in particular non-technological R&D is treated.

This section draws heavily on Miles et al (2006) who reflected on measuring services R&D. Their key conclusions are given in the box 4.1 below and will echo in the remainder of this section.

BOX 4.1: KEY CONCLUSIONS REPORT FORESIGHT ON SERVICES AND R&D (Miles et al., 2006)

"There are many problems with measuring services' R&D. These mean, for instance, that we are likely to be underestimating a good deal of the R&D effort actually undertaken in services, and to be overstating the size of the US-EU gap.

Even so, R&D as conventionally understood appears to be lower in services firms than in comparable manufacturing firms. Similarly, there does seem to be an ongoing tendency for the US services' sector to undertake more R&D than EU equivalents.

Services' R&D as conventionally understood is likely to increase both absolutely and relatively, and appears to be a promising target for policy action.

However, there are dangers in putting too much emphasis on conventional R&D. There are other innovative activities that are also important. They may be equally deserving of policy and management attention, and overemphasis on R&D (or one notion of R&D) might skew innovation in suboptimal directions."

The services low tech heritage

Services still suffer from the image of being passive users of (embodied or disembodied) R&D developed elsewhere. For a long time services were not taken seriously in relation to R&D. Services showed less technological opportunity[19], did not dispose of separate R&D departments and proper R&D management, were not well connected to external R&D services or the science base. This resulted for example also in innovation policies that are up until today biased towards manufacturing firms and technological R&D. Similarly, R&D and innovation surveys have been largely formulated with technological R&D in

[19]Miles et al. (2006) use the phrase "R&D unfriendliness" in this context. They observe that: "Many services seem to be "R&D-unfriendly". In part this may reflect the nature of their products and processes – heavily based on professional knowledge and intense interaction with clients to produced intangible products, for example. Until the advent of new IT, at least, it is hard for such archetypal service activities to be submitted to much sustained technical innovation (except, perhaps, for large firms who could institute high levels of division of labour). This leads to another factor behind "R&D-unfriendliness". Even if there are now many opportunities for technological innovation in services, it is likely that services' heritage is such that, even when elements of these opportunities are grasped, they are not related to R&D. This is not just that services fail to see the activities they undertake in, say, software engineering, as R&D. They also do not see scope for organising these activities in conventional R&D departments and management structures, in making use of external R&D services or the science base, or in participating in networks involving other organisations active in such fields of R&D. There may be good reasons to do with the service product and process – or the inadequacies of external sources of knowledge – that mean that such moves towards more conventional R&D are not necessarily appropriate for services. But it is likely that often service firms are following innovation trajectories that have as much to do with organisational heritage as with strategic choice."

manufacturing firms in mind and in sampling frameworks in which service industries are traditionally underrepresented. Miles et al. (2006) in this context note that "…The heritage of services may mean that while services have become more active in R&D (and other innovative practices), this is not (yet?) reflected in their organisational and reporting structures. This could be a factor in, for instance, services rarely organising "conventional" R&D management structures, and more often using "project development" teams where major innovation is concerned. It also probably underlies services being poorly linked into innovation and R&D systems in the wider economy. These features may mean that services are less familiar with the R&D construct, and less prone to use this terminology internally and/or in reporting activities to the outside world."

Invisibility or lower levels of formalization of R&D in services

R&D and innovation in services are sometimes lower compared to manufacturing, but quite often simply less well visible. Service firms might perform less R&D because of the nature of the product which does not lend itself to R&D, the perceived difficulties in appropriating the benefits from R&D investments or for example the limited scale of the firm innovation efforts. However, service innovation may not require formalised technological R&D as we know it from manufacturing firms. It not seldom involves conceptual or organizational innovation, smart combinations in which technology is enabling rather than dominant and quite often involves new type of business models. Miles et al (2006) note that " …there are many services firms who undertake creative work, aimed at developing new products and solutions, on a more or less systematic and regular basis. However, often they are not applying formal or scientific methods, but rather letting their professional workers exercise their creative talents, explore possibilities in craft-like fashion, etc. Other activities that lie on the boundaries of R&D include aesthetic and design-oriented activities, some sorts of market and organisational research, and the like." The R&D function is in other words less well visible, e.g. as there might be no R&D specialists (rather mixed project teams of service professionals that work on a particular development project they might not even as a R&D project themselves), no R&D department, no formal R&D management and what could be labelled as R&D is, in practice, hard to separate from for example design, market research or more widely experimenting. R&D-like activities are "often closely related to practice – closer to service delivery than to more abstract research in laboratories. The activity may or may not be formalised – even in technology-oriented services there can be a great deal of craft-like exploration rather than more engineering-style systematic search. Analysis of services innovation suggests that often services do not capitalise on on-the-job innovations: the knowledge established during service production and delivery is not "captured" and "reproduced" in successive innovations." (Miles et al. 2006). The low tech heritage and invisibility or low level of formalisation leads in practice to an underreporting of services' R&D.

Underreporting of services sector R&D

Underreporting of R&D seems to be a real phenomenon. The underreporting is likely to be due to a combination of factors. There is often a different structure of R&D-like activities in services, such that activities that are underreported very widely are more prevalent in services. Social research, some software activities, are areas of R&D which often go un-recorded, whilst the lack of specialised R&D occupational positions or management structures also means the profile and measurement of R&D in service industries remains neglected. Why would apparent underreporting of services R&D persist? The reasons mentioned in Miles et al (2006) include the following:

1. It is hard to differentiate between R&D and other innovative activities (especially those involved in service design and delivery, working with clients, etc.), and indeed it can be hard to differentiate between innovative and more routine activities in many knowledge-intensive services.

2. This is related to the fact that services rarely identify R&D as a specialised function –R&D departments are rare, and few staff are dedicated to innovation effort though many do work on innovation some of the time (often in the course of service production and delivery).

3. Activities such as software development and web service development, are often not seen as R&D, even though much of these activities come under the formal definition of R&D now (see OECD, 1994). Though there is often confusion about whether activities such as market research should be included; much market research is explicitly ruled out of the definition of R&D.

4. Uncertainty about whether R&D has to be oriented toward new product development. Thus, innovation-oriented market research appears to be ruled out of R&D, and much environmental and industrial scanning may be considered to be ruled out even though this may involve commissioning a research team? However, there may also be cases where such activity is seen as R&D when it might be more routine scanning.

5. Social science sometimes seems to be ruled out, partly implicitly and partly explicitly. Hence, the issue arises that the way in which "R&D" is presented in official surveys means that social research-based R&D is liable to be underrepresented in official survey results – and this probably means more undercounting of services' R&D than that of manufacturing.

These measurement problems obscure real R&D growth in services. It is likely that at least part of the of the current recorded R&D activities in services were previously hidden[20]. Further, when trying to correct for underreporting of services' R&D that takes place in services, 'we should not throw away the baby with the bathwater'. Services' R&D will not be a relevant option for all firms (as some firms are simply less well positioned in terms of size, knowledge and competitive position). Additionally, services R&D and technological R&D are mostly strengthening each other and increasingly vital for manufacturing firms. In fact, R&D and innovation taking place in hybrid firms (see section 4.6) will increasingly show combinations of both. Finally, we should realise that R&D is one of the sources of innovation next to other sources, such as investments made in new service concepts, new way of relating to clients, new organisational structures and more generally the wider knowledge base of the firm included well educated and well trained people. However, there are grounds for believing that there is a growth of R&D in many service sectors, and a rapid growth in the levels of activity of R&D-intensive technology-based services and that these trends are also being picked up in the statistics.

[20]Miles et al. (2006) observed in this context that "Some, and perhaps a good deal of the recorded growth in services' R&D, and the differentials between US and EU R&D, is a matter of different and changing measurement practices. Sometimes the changed practices are yielding potentially misleading results (such as a substantial share of US trade sector R&D being down to firms whose main business is manufacturing, but who employ many sales and distribution staff)."

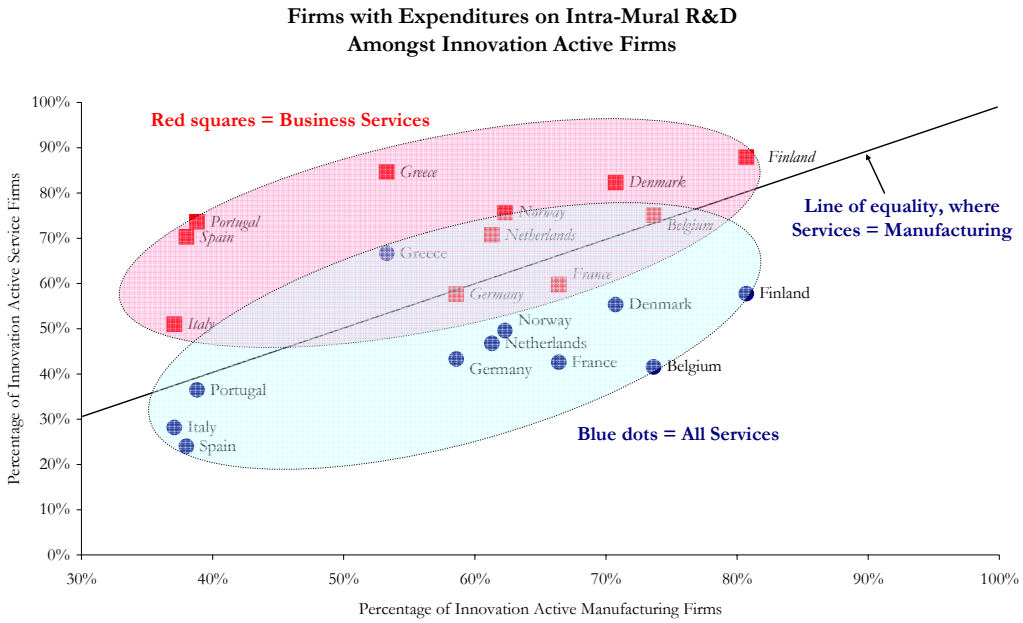
4.4 How likely are business-related services to engage in R&D and innovation?[21]

If we now confine ourselves to the business-services category[22] and the likeliness of firms therein to engage in R&D and innovation, we see a somewhat different picture from that outlined above (figure 4.1 below). Using the aggregated CIS3 dataset we can first compare the share of *innovation active service* firms with *innovation active manufacturing* firms for 11 EU countries for the period 1998-2000. With regard to R&D activities, this shows that overall (and with the exception of Greece), innovation active service firms are less likely to engage in R&D than are innovation active manufacturing firms (as indicated by having expenditures on intra-mural R&D in 2000). The service firms shown in the figure are already a delimited group: firms in the sector tend to demonstrate less likelihood (than manufacturing firms) of engaging in intramural R&D. The apparent lack of intramural R&D can in principle be offset by more extramural R&D (which is mostly not the case) or other (non-R&D) innovation activities. A second observation is that, if we confine our analysis to *innovation active business service firms*, such firms are actually more likely to have had intra-mural R&D expenditures than their manufacturing counterparts (with the exception of France and to some extent Germany). Logically then, it follows that innovation active services firms that are not business services (e.g., wholesale, transport and distribution, etc., some of which are included under our definition of business-related services) are very unlikely to have incurred expenditures on R&D. As indicated in chapter 2, this illustrates the large variety among service industries regarding R&D activities and even under business-related services. Some business (-related) services are in fact more R&D active than most of their manufacturing counterparts.

[21] This section is partly based on Tether, B. (2006).

[22] This admittedly is only one of the (bigger) business-related services industries. However, more detailed data that exactly match our business-related services categories are missing.

Figure 4.1: Firms with expenditures on Intra-Mural R&D amongst Innovation active firms



This finding was also supported by the RENESER case studies on R&D and innovation as reported in chapter 3. We found that nearly all service firms involved in our small sample demonstrated significant levels of technological R&D (and technology-enabled innovation) alongside process, service delivery and organizational innovation. This was not only the case in those firms where it might be expected most – i.e., hybrid firms and KIBS – but also in some of the transport, financial and retailing companies. Further we found that - although services R&D&I is comparatively less formalized, more distributed, and less explicitly managed and funded - most service firms in our sample afforded some form of structured attention to services R&D and innovation. Although, formalised pure services R&D and innovation is the exception rather than the rule, we found that in practice, important services R&D and innovation activities can be hidden under labels such as 'business development', 'service improvement', and 'new service development' etc. These activities are quite frequently not recognised as services' R&D&I by the firms that undertake them. We also found that much services R&D is hidden in client-specific solutions (i.e., as it takes place close to the client rather than within the firm, it is less visible and less likely to be perceived as R&D).

With respect to the conception, nature and form of R&D&I in service firms, our case studies highlighted a number of important points. Whilst these received detailed treatment above, some of the key themes are worthy of reiteration and summary here:

- Technological development, especially that relating to ICTs, is a highly important factor in service innovation – in many cases it provides a key driver for innovation and in others it is a core enabler. Whilst technology is not at the heart of all service innovation - and a significant level of pure services R&D is in evidence - most business-related service firms undertake or rely upon at least some technological R&D (though this can be more or less hidden, depending on the firm and its specific circumstances).

- In a majority of cases, the term R&D remains firmly associated with notions of technological development (i.e., the creation and application of new technologies). Representatives of business-related service firms frequently speak of technological R&D in terms that relate to the development of new devices/systems, or the application of technologies in new contexts, particularly as supports to the 'service machinery'. Technological R&D (in the service domain) is often associated with the creation of the facilities and platforms via which services can be provided. The term R&D is not frequently used to describe the creation or enhancement of new services – for these activities, alternatives such as 'customer-focused innovation', 'service improvement' or 'advanced retailing' tend to be deployed. It is clear that a definition and conceptualisation of services R&D is lacking, and that there is no established vocabulary that would permit the discussion of service-oriented R&D.

- The level of technological R&D that takes place in sample cases is quite striking: activities include software engineering and development, and 'pure technological R&D' (especially in some KIBS). However, technological R&D is not confined to hybrid firms and KIBS: it features quite prominently and extensively across a broad sweep of business service organisations.

- Considerable process and organisational innovation - including that relating to service delivery - is present in a majority of case studies (and this often sits alongside, or is complemented by technology-based innovation). Process and organisational innovation rarely attracts use of the descriptor R&D and is almost never described as 'service R&D'.

- Although formalized service R&D strategies, budgets and processes are lacking in most cases, there is a trend in some organisations towards formalisation of planning, management and resourcing for services R&D&I. This pattern is most visible in hybrid firms (and some KIBS), although it is paralleled by a recognition in other business-related service firms that greater efforts to structure innovation activity are desirable. In some large and innovation intensive firms (especially those where R&D is embedded and formalised), the distinction between R&D relating to goods, technologies and services has been eradicated.

Our case investigations also revealed that the propensity of business related services to undertake R&D or to become involved in innovation is shaped in some ways by the presence or absence of innovation *drivers* and *barriers*. Of course, drivers and barriers and their impacts tend to be specific to individual companies and the trading, market and economic environments in which they find themselves. However, it is worth reviewing here some of our general findings in relation to drivers and barriers for business related services.

For most, if not all companies in our sample, the overarching drivers for R&D&I are the need to (a) enhance competitiveness, and (b) differentiate service products from those of competitors. A key concern for many companies with respect to competitiveness is the requirement to map and respond to client's needs (and changing patterns of demand in general). Moreover, many report a desire to improve competitiveness and customer loyalty by offering an improved service to clients: this sometimes implies the establishment of more intimate co-innovation and trading relationships with partners. Aspirations connected with enhanced competitiveness can also be pursued via an effort to enter or create new service markets (either in domestic or in overseas territories), or by the enhancement of internal processes (leading to cost reductions or quality improvements). Differentiation strategy is an important consideration for many service firms, especially so as markets become increasingly globalised and entry barriers (in some sectors at least) are reduced.

The commoditisation of some forms of services is adding to the pressure for differentiation and, in a number of business-related service segments, there is a clear push among incumbents to innovate in the provision and delivery of higher value-added and specialised services. Commoditisation is also resulting in some process and organisational innovation as companies move towards outsourcing strategies, especially with respect to routine functions.

New legislation and politically inspired shifts in the regulatory environment are a further important driver for innovation and impact on business related service firms in two main ways. First, the enactment of new laws - laws that might initially present a perceived constraint on existing activities, for example, those relating to waste disposal, personal privacy or the labour market - can subsequently, and often rapidly, provoke an innovative response in the form of 'workaround' solutions and processes. Indeed, it is not uncommon to find firms that have identified and operationalised highly creative ways of circumventing regulations that initially impacted negatively with existing products or *modus operandi*. Second, some forms of regulation can be an important spur for innovation: new laws frequently create new demands and the search for innovative solutions. The case of environmental monitoring and management is an interesting one here. As environmental regulation in Europe has been tightened progressively, the continent has witnessed a dramatic expansion in firms offering consultancy and advice, innovative technological fixes, and novel remediation and maintenance services.

Barriers to R&D&I in the business-related services sector – beyond the absence of drivers – include those that are discussed commonly in innovation studies (lack of access to finance, risk aversion at management level and among potential funding agencies, cross-border tradeability, competing priorities etc.). However, the case studies assembled during the current study also highlighted some less-commonly cited factors. Key amongst these was a perceived lack of knowledge, capacity and management expertise to support and sustain the service R&D and innovation process. Whilst some innovation management tools are available, the structures, 'cookbooks' and stocks of practitioner experience that are found commonly in the manufacturing sector are largely absent in services. Formal training in service innovation management is rare in Europe, and it appears that there is little in the way of official support or encouragement for innovation that is specifically designed for (or pitched-at) service firms. A second important barrier concerns demand factors. Some respondents in case interviews indicated that their served-market tends towards caution and conservatism. They reported that business consumers of service products sometimes demonstrate a high-level of contentment with existing levels/forms of delivery and anxiety when confronted with novel (and thus apparently untested) offerings. Where the benefits of an innovative service are unclear, and particularly where increased costs are implied, potential consumers can be deterred from take-up, preferring instead to invest in familiar products and forms of delivery.

As reported elsewhere, the likelihood of encountering business-related service firms with some form of R&D is considerable. However, levels of *formalisation of R&D and innovation* are generally substantially lower in services than they are in manufacturing firms (especially when size is taken into account). Again, some interesting issues were raised in the course of the development of the case studies.

- *Codifying practice* - it is clear that formal and codified methods, guidelines and practices for the planning and management of services R&D&I are limited (indeed, they tend to be found only rarely). Whilst scenario development and service road-maps are in evidence in some organisations, these tend to be confined only to larger organisations (and often those where service innovation is enabled by, or developed in tandem with, technology-focused R&D). Moreover, it was clear that a

large number of firms in our sample are struggling with development of service innovation strategy and with the formalisation of R&D&I processes. Formal methods for managing services R&D and innovation (such as 'portfolio management') were encountered in less than half of our cases. Similarly, at innovation project level, less than half of the firms in our sample used formalized service development models (and where these were in evidence, they were largely rudimentary, being based for example on 'funnel' and 'stage gate' models).

- *Movement towards structure* - despite the above, some firms do demonstrate interest in (and in some cases, action in pursuit of) the formalisation of R&D&I strategies and a more structured approach to planning, budgeting, managing and monitoring innovation. Some are also clearly considering the appropriateness of deployment of more structured service development concepts and models, and the inception (or enhancement) of an intelligence function. The latter is perceived to bring potential benefits in two ways, (a) as a mechanism for harvesting ideas for innovation, and (b) as a means of 'learning about doing innovation' (i.e., as a way of capturing data relating to the innovation process that can be re-used in future innovation episodes).

- *Coordination* - innovation processes and practices are multi-faceted and their management involves managing intelligence, managing product development (and marketisation), and managing diffusion of best practice. Each of these facets overlaps substantially, but all are important and all must be afforded consideration in the effort to generate innovation strategies and codify the R&D&I process for services.

- *Articulation* - a key challenge with respect to management of innovation in service firms is the linking of centralised and distributed approaches to R&D&I. This problem is one that affects larger hybrid firms disproportionately, and one that requires that attention is devoted to bridging and communications between front-line, client focused operational staff and centrally-located R&D and business development personnel. A two-way, coordinated flow is required – on one hand R&D staff must be able to communicate the potential benefits and functionality of existing/forthcoming products, on the other, operational workers must be able to feedback ideas with respect to emerging market needs.

To summarise, the available statistical evidence, supported by data from our own case studies, demonstrates that, whilst innovation-active services firms are less likely to engage in R&D than their innovation-active manufacturing counterparts, some innovation-active *business-related* service firms are more likely than manufacturers to record intra-mural R&D investments. Indeed, some business services are more R&D active than a majority of manufacturing companies. In addition, business-related service firms reveal a disproportionate propensity to invest (to a greater or lesser degree) in various forms of 'non R&D' innovation activity, and such activity is frequently connected intimately with business and competitive strategising. The case studies analysed here and above also indicate that many business-related service firms engage in significant levels of technological R&D and that such activity frequently complements, supports or enables process-oriented, service delivery and organisational innovation. Whilst it is clear that business services are major performers of R&D&I, case investigations also reveal that – in general - significant differences exist between services and manufacturing firms with respect to conceptualisation, organisation and management of innovation. First, the concept of R&D is used only rarely to describe the forms of development activity that are undertaken within service organisations (even where these appear to accord with R&D practices as narrowly-defined). Terms such as 'project development' or 'service improvement' are used to

describe innovation activities. Second, formalised processes and structures for innovation are comparatively unusual in the services industries – R&D&I tends to be less formal, more distributed and less explicitly managed and resourced (although trends towards formalisation and codification are becoming more evident). Third, the motivations for and orientations to innovation in the business-related services sector can differ from those found in manufacturing: whilst formalised, perpetual R&D in pursuit of new product development is common in the latter, *ad hoc* development activity in pursuit of enhanced competitiveness and service differentiation is found more frequently in business-related service firms.

4.5 The special case of R&D services[23]

Over the past few decades R&D services have grown into a dedicated business-related service industry of a still limited size. A combination of factors can explain growth. Firstly, the fact that the R&D function is seen as a dedicated service function which can be outsourced or insourced. Secondly, the fact that more Higher education Institutions (HEIs) and Research Technology Organisations (RTOs) have developed commercial R&D service firms. Thirdly, probably some re-labelling has occurred as especially in industry some R&D departments have been turned into separate firms which might be picked up in regular production statistics and R&D and innovation surveys as R&D services.

There has been growth in the *outsourcing of R&D* activity by both manufacturing and service firms. This has obviously impacted on the growth of R&D activity by service firms. There are two obvious ways in which this could occur. Firstly, by the growth of the R&D services as an service industry (NACE 73) leading to the growth of R&D activity overall in the service sector (i.e. the growth of the service R&D industry relative to total R&D growth in all services) and as a 'display effect'. Secondly, by somehow making it easier for service firms to undertake R&D (by getting someone else to do it, via outsourcing), it is encouraging them: i) to do more R&D, and, ii) to consider undertake some R&D in-house as well as externally (if the previous outsourced R&D work has had a successful outcome to the operations of the firm).

R&D services as an activity is difficult to define and interpret. For example, most R&D in manufacturing is allocated to the relevant NACE sector, however in some cases if an R&D laboratory is freestanding and separate from manufacturing or other activities it may be allocated to the R&D service activity[24]. Much R&D is performed in-house, though R&D survey data demonstrate a substantial share of outsourcing of these services which, in for example finance, is considerably higher and in the distributive trades is considerable lower than in manufacturing. Not all of this outsourcing is, however, to the specialised R&D services sector. Analyses do further show that R&D services are the most highly linked to universities (in terms of sourcing information for innovation, and in terms of innovation collaboration) of any sector[25].

How is the R&D services sector characterised in terms of growth, value added, size structure and so on? In 2002, across the EU25, the value-added by R&D services was € 13.3 billion, although most of this was accounted for by the EU15 – € 11.9 billion. EU25

[23] This section is largely based on Howells (2006).

[24] See Howells (1984).

[25] This is particularly interesting in that services sectors tend to have lower levels of linkage to universities than do manufacturing sectors; Institute of Innovation Research (2003).

employment in R&D services was 365.5 thousand (EU15 - 289.7 employees). However, R&D services are small compared to most other business service sectors.

There remain major differences between major EU countries in terms of the size and share in their economies. As can be noted in table 4.3, France for example has by far the most significant R&D service sector in terms of value added and employment as expressed as a percentage of total business services, followed by Finland. By contrast, it remains very small in Spain. These large differences cannot be explained by different culture and strategies in outsourcing of R&D alone and can be traced back to differences in institutional set-up and different statistical approaches to measuring R&D services.

Considering the growth rates of the various sectors, in terms of value added, and employment, there is some indication that R&D services have grown less than computer services, while the picture compared to renting and “other business services” is much more mixed. In terms of employment there are fewer negative growth rates but the highest growth rates are also much reduced. These trends suggest variations in productivity trends across countries.

If we look at the demand side for the services offered by R&D services quite a complex set of results emerges. Based on an analysis performed by Peneder (2004) we can see what industries are high and intermediate R&D service user sectors. Some users of R&D services are highly science-intensive sectors such as pharmaceuticals; communications equipment; and – presumably – defence. Others are not so obviously dependent on advanced knowledge, such as the water and sanitation industries (where the technologies would seem to be long-established) and membership organisations (perhaps motorists’ clubs have been engaging in R&D connected with positioning and mapping systems?). The picture is even more mixed among the intermediate users, where one would not necessarily anticipate HORECA as a substantial user of R&D. Of course, these data tell us about the intensity of use by various sectors of the economy, not about how important these user sectors are for R&D services. A major sector’s intermediate (or even low) intensity of use may well be more than a smaller sector’s high intensity of use. We would need to go back to the original input-output tables to examine how much of the output of various countries’ R&D services are being absorbed by different user industries. We suspect that there will be high variation across countries in this respect (as, for example, the size of the pharmaceuticals sector varies across countries).

Table 4.3: Composition of R&D Services to total Business Services in relation to Value Added and Employment, 2000 (Source: ECORYS (2004) calculations from OECD STAN database

	% of Value added				% of Employment			
	Renting (71)	**Computing (72)**	**R&D (73)**	**Other (74)**	**Renting (71)**	**Computing (72)**	**R&D (73)**	**Other (74)**
Austria	16.6	14.8	2.7	65.8	4.5	12.4	2.6	80.5
Denmark	4.9	18.6	4.2	72.3	3.0	16.0	3.2	77.8
Finland	4.1	25.5	7.7	62.7	2.2	23.2	8.5	66.2
France [1]	7.2	15.0	9.7	68.1	3.0	10.9	10.6	75.4
Germany	14.5	13.1	3.1	69.3	2.1	10.2	3.6	84.1
Greece	9.2	5.9	2.3	82.6	0.8	6.3	4.1	88.8
Italy [2]	..	{ 19.9 }		80.1	..	{ 23.4 }		76.6
Luxembourg	6.4	16.1	{ 77.6 }		1.7	11.3	{ 87.0 }	
Netherlands	9.0	16.1	3.5	71.4	1.9	9.7	2.8	85.5
Spain [3]	6.7	14.9	0.6	77.8	3.7	11.0	0.8	84.5
Sweden [3]	5.5	27.9	{ 66.7 }		2.5	18.9	{ 78.6 }	
UK	8.1	19.2	3.3	69.4	4.7	13.1	3.1	79.2

1. Other business services (74) includes sewage and refuse disposal (90)
2. Business Services excluding renting of machinery and equipment (71)
3. 1999

Table 4.4: High and intermediate users of R&D services (Source: Peneder, 2004)

High R&D service intensive user sectors (Classified as High 73)/ Non-service sectors:
2423 (Pharmaceuticals); 32 (Radio, TV and communication equipment); 352p359 (Railroad equipment and transport equipment n.e.c.); 41 (Collected and purified water, distribution services of water).

High R&D service intensive user sectors (Classified as High 73)/ Service sectors:
75 (Public administration and defence services; compulsory social security services); 80 (Education services); 90 (Sewage and refuse disposal services, sanitation and similar services) and 91 (Membership organisation services n.e.c.)

Intermediate R&D service user sectors/ Non-service sectors:
30 (Office, accounting and computing machinery); 31 (Electrical machinery and apparatus n.e.c.); 33 (Medical, precision and optical instruments);351 (Building and repairing of ships and boats); 36 (Furniture; other manufactured goods n.e.c.).

Intermediate R&D service user sectors/Service sectors:
55 (Hotel and restaurant services); 80 (Education services); 85 (Health and social work services).

Eurostat has also recently published comparable input-output tables for most of the EU25 (plus Norway). Analysis of each requires some effort. However, the main users of R&D services in selected countries have been analysed. There are various ways in which these data might be represented, but for the present the following was considered: (a) the top ten users of the R&D services sector; and, (b) the shares of the output of the sector they are consuming. This gives an idea of who consumers R&D services, and how concentrated the output is, sectorally. Table 4.5 below presents these data.

Table 4.5: Main User Sectors of R&D Services (Source: Howells, 2006,p. 12, based on Eurostat data)

UK		France		Germany	
Users of R&D services	**% of output being used**	**Users of R&D services**	**% of output being used**	**Users of R&D services**	**% of output being used**
Health and social work services	13.01	Chemicals and chemical products	16.35	Chemicals and chemical products	37.81
Other business services	12.32	Public administration and defence services; compulsory social security services	13.20	Public administration and defence services; compulsory social security services	21.17
Public administration and defence services; compulsory social security services	11.03	Motor vehicles, trailers and semi-trailers	11.04	Research and development services	13.79
Education services	8.00	Radio, television and communication equipment and apparatus	10.86	Education services	9.59
Sewage and refuse disposal services, sanitation and similar services	6.30	Research and development services	6.62	Rubber and plastic products	4.40
Recreational, cultural and sporting services	4.51	Other transport equipment	6.33	Sewage and refuse disposal services, sanitation and similar services	3.79
Construction work	4.22	Medical, precision and optical instruments, watches and clocks	4.50	Health and social work services	3.22
Chemicals and chemical products	3.21	Post and telecommunications services	3.75	Motor vehicles, trailers and semi-trailers	1.92
Research and development services	3.04	Electrical machinery and apparatus n.e.c.	3.23	Other non-metallic mineral products	1.17
Land transport; transport via pipelines services	2.79	Machinery and equipment n.e.c.	3.10	Electrical machinery and apparatus n.e.c.	1.00
Share of output consumed by top 5 users	50.66		58.06		86.76
Share of output consumed by top 10 users	68.42		78.97		97.85

The results show some similarities across R&D services use across countries – the "public administration" (dominated by defence activity) vector for France, Germany and the UK, for example; the importance of the chemicals sector (especially in France and Germany). Some other sectors appear in two or more countries: health, education, sewage (all mainly public services). Usage tends to be concentrated in all countries, especially Germany. It will be interesting to see if the usage patterns can be accounted for by the size of the user sectors and their performance of in-house R&D. Equally striking is the considerable disparity across countries, which will probably be accentuated when we undertake analysis for smaller and/or less industrialised countries. The variations in "top users" from country to country suggest that we will find R&D services oriented in very different ways across the EU.

4.6 Services R&D and innovation in hybrid firms[26]

The Communication on business-related services (Commission of the European Communities, 2003) illustrates the enormous economic role of this type of services and discusses their contribution to the performance of European enterprises. By using the term business-related services the Commission "focuses on those services having a direct impact on the competitiveness of enterprises" and it defines them in accordance with the EU statistical activity nomenclature (NACE).

However, by using this definition it should be not forgotten that also within manufacturing firms a significant share in turnover results from business-related services. There are hardly any reliable data, since services in manufacturing firms are not included in official statistics. But existing studies point on the fact that in manufacturing firms, depending upon the industry, between 7.5 and 25 per cent of the turnover is accounted for by services and this trend is increasing.

Services in manufacturing firms are essentially services, which are sold together with material goods (e.g. construction service for a machine, planning of a production plant) – independent of whether they were self-provided or externally procured and also independent of whether they were separately invoiced or as hidden costs. Services, which are offered as independent services on the market, are also to be included (for example maintenance, repair or installation of third-party machines). Therefore it is not compulsory that the services are supplied in combination with material goods, but it is crucial that the services are closely connected to the material goods.

A classification of manufacturing services was developed by ZVEI (i.e. the German Electrical and Electronic Manufacturers' Association)[27]. Here seven categories in total were established depending on the relationship to material products and the adaptability of the services to customer requests.

Table 4.6: Classification of services in manufacturing firms (ZVEI 2005)

Class 0: Product-related basic services	– Basic documentation – Support and catalogue information by telephone – Warranty in compliance with general terms and conditions
Class 1: Product-related standard Services	– Technical documentation – Information via the Internet – Telephone assistance – Software licenses and upgrade options – Training – Assembly and commissioning services – Technical product support at manufacturer's or on site – Repairs and/or supply of spare parts after expiry of warranty – Extension of warranty
Class 2: Product-related customised services	– Information on the availability of products and spare parts and the delivery times – Product-related approvals and certificates – Technical support via telediagnostics and teleservice – Fault analysis

[26] Based on Meiren (2006a).

[27] In science and in practice there are a multitude of other classifications. Brax (2005) und Garbe (1998), for example, summarise this.

	– Qualified support outside business hours – Consulting and assessment – Commissioning support – On-site service – Customised training – Product adaptation without changing the standard functionality – Factory acceptance testing
Class 3: Application-specific services	– Application or feasibility study – Examination of the complete installation situation – Support in the choice of products (hardware and software) to meet application specifications – Check for compatibility with third-party products – Application-specific adaptations – Modification of the hardware and software – Verification of data exchange
Class 4: System-related services	– Configuration based on customer-specific requirements – Functional system modifications – Delivery of the system – Installation/assembly of the system – Commissioning of the system – System-specific training – Acceptance testing – Support during startup phase – Maintenance
Class 5: Plant-related services	– Participation in feasibility studies and budgeting (recommendations regarding optimised utilisation of resources and improvement of the production process for the customer) – Drafting of specifications – Checking for feasibility and performance parameters – Coordination and supervision of products and systems from different manufacturers – Adaptation to different process-related facilities (mechanical, pneumatic, hydraulic etc.) – Implementation of the user software (information systems and system administration) – Process-oriented training – Maintenance of production facilities
Class 6: Extended plant-related services	– Proposal for process optimisation – Financial planning – Engineering and supervision of multidisciplinary customer projects – process expertise – demand assessment: brief and detailed pre-studies – study on process -related security, availability and reliability – Management of a multidisciplinary company group in relation to the process – Management of maintenance and/or operation including resources planning (human resources, materials, auxiliary systems) – Maintenance engineering for the plant

In manufacturing firms, service has long been understood as hardly more than the repair of material goods within the warranty obligations. The manufacturers are limited to the technical customer service, which must first of all ensure the functionality of the offered products. Providers often regarded services as an undesired extra and a reactive attitude

prevailed. This perception was shaped by a market situation in which a few providers confronted of a multitude of customers. In this configuration, identified as a seller's market, the customer's needs came second to the requirements of the provider.

The market situation was transformed by the saturation of the markets and an increasing globalisation. In a buyer's market with a large number of providers, from which the customers can chose, providers must orient themselves towards customer requests. Goods service is identified as an auxiliary service, through which a provider can be differentiated from its competitors.

The expansion and professionalisation of manufacturing services is however seen not just as a reaction to the drafted changes. Also without pressure to change, the expansion of the business with services recovers chances, which the industry should seize. Here are named in detail (Lay and Jung Erceg, 2002; ADL, 2001):

- Chances to increase turnover and profit, which are not achievable in extensively saturated markets and high price competition.
- Balancing of demand fluctuations in the business with material goods. If, depending on market conditions, the demand for industrial products declines slightly, the demand for spare parts, repairs, modernisation services and service hotlines increases.
- Cross-selling effects through an improved customer loyalty with services in manufacturing firms. For example, repairs to external products increase the chances of being considered with replacement investments as a supplier.
- Notes for product innovations through an intensive customer contact and deepened insight in the utilisation situations of material products with customers.

Altogether it is shown that manufacturing companies are increasingly regarding services not just as simple "add-ons" to the material goods business but are attributing them a competitive strategic significance. At the same time, through a reinforced service orientation, new challenges to corporate culture, organisation and human resource management are also met.

The preceding remarks have shown, that services play an increasing role in manufacturing firms and that there is a trend towards new service offerings. Thus the questions emerge, how these new services are developed and how R&D for this kind of services is done. To find initial answers, a literature analysis was conducted in the context of the project as well as an examination of existing studies and the analysis of individual cases from manufacturing industry (see Meiren, 2006a for more detail). The results can be summarised as follows:

Increasing significance of services in manufacturing firms:

All available studies attribute an increasing significance to services for manufacturing firms. Neglected for a long time, services are attributed an important role in the differentiation to the competition but also to the turnover and profit increase, to attain important customer information and to improve customer loyalty.

Hardly data on services' R&D in manufacturing firms available:

So far, services' in manufacturing firms are virtually not included by the official company statistics. Additionally, available studies concentrate, on the one hand, on countries with a traditionally strong manufacturing sector and, on the other hand, on certain industries such

as plant and construction engineering and the electrical industry. Therefore, altogether, only a fragmented picture of services in European manufacturing firms is produced.

Firms invest in services' R&D:

The survey results as presented in Meiren (2006a) as well as in four of the RENESER case studies that dealt with hybrid firms make clear that the willingness to invest in services' R&D is growing with manufacturing firms. This affects both the development of new service products (e.g. tele-services) as well as the preparation of the necessary infrastructure (e.g. creation of R&D departments for services).

Transfer of product development know-how to services:

Since many manufacturing firms already have extensive experiences with the development of services, many begin here to transfer their product development know-how to services and to use it there, for example when it deals with the structuring of the development processes and the use of formal methods. However, the danger herein is that the so-called "soft factors" (e.g. customer interaction, human resources), which play an important role with services, miss out.

All in all, services' R&D in hybrid firms is a highly interesting subcategory within business related services as it not only directly illustrates how important service functions have grown to manufacturing companies (and in a way illustrates the real intertwining of services and manufacturing activities at the micro-level), but also is a subcategory where more systematic services R&D models and management tools are likely to emerge in the next few years. It further raises the issue that furthering service innovation cannot be done using a sectoral approach. Finally it raises numerous themes for further research and debate as information is anecdotic thus far.

4.7 Summary: Is there a R&D deficit in BR services?

The main messages to be derived from this chapter can be summarized as follows:

- Services at large show a low (technological) R&D intensity, but services sector R&D intensities are on the rise and especially business services and computing services are growing more swiftly (but far from uniform over countries). More detailed sectoral R&D figures are lacking to see whether business-related services match this overall trend.
- The low tech heritage and invisibility or low level of formalisation still leads in practice to an underreporting of services' R&D. Measurement problems (e.g. how to sensibly differentiate between R&D and innovation in services, the low level of formalisation of services' R&D, the under recording of social-research based R&D) obscures real R&D growth in services. The picture is further blurred by parallel developments such as sectoral shifts towards more technological R&D intensive service industries, outsourcing of services R&D, rise of services' R&D in manufacturing (and the re-labelling that sometimes comes with it) and varied speeds (in various countries especially) at which the traditional underreporting of services' R&D is dealt with. However, there are grounds for believing that there is a growth of R&D in many service sectors (including business-related services. There especially is a rapid growth in the levels of activity of R&D-intensive technology-based services. These trends are increasingly being picked up in the statistics.
- Some, though not all, business-related services are clearly committed innovators and many invest heavily in technological R&D alongside other activities. However,

traditional (technology- and manufactures-focused) interpretations of R&D still dominate in both the services and manufacturing sectors, a situation that leads to much activity in the former being missed by current gauges of innovation intensity. A more comprehensive interpretation of R&D would imply a recognition of more forms and variants of R&D and might lead to a greater appreciation of business-related services activities and their contribution in terms of economic growth.

- R&D services are a special kind of business related service category that are essentially about the service R&D function being outsourced to a dedicated services R&D firm. The industry is in the EU of still limited size (in 2002 € 13,3 billion value added and 365.3 thousand employees in EU-25). Its growth might contribute to further lower the barrier for other service firms to engage in R&D. Their growth is non only dependent on the different approaches to outsourcing R&D between countries, but also on the sectoral specialisation and institutional set-up of individual countries. For that reasons demand patters are highly country specific still.
- An increased service orientation of manufacturing firms makes that services R&D as performed in manufacturing might account for 7,5%-25% of manufacturing R&D (depending on the sector). It is here that more systemic services' R&D models and management tools are currently emerging and formalisation of services' R&D is most developed.

The question whether there is a R&D deficit in European BR services compared to US business related services is hard to answer with a simple yes or no as detailed statistics are missing in the first place and if they are available most likely do not do justice to much services' R&D. We are in other words trying to measure here with a very partial measure services R&D and R&D in business-related services, where country and sectoral variety is immense.

Nevertheless, the overall lower services R&D score for the EU compared to the US is likely to hold for business-related services as well. These differences can be explained by factors such as:

- the prevalence of 'big players' in especially computer and software services (as well as health services) in the United States. These big players currently drive 70-80% of the overall R&D performance and the US simply has more of these in a number of service industries. These big players are partly the result of consolidation in a large market whereas in the EU a smaller share of services operates at an EU-scale.
- The labelling of services R&D in statistics. At what moment in time is a manufacturing firm with increasingly important service R&D activities relabelled to a service industry (as has happened to IBM). Of course re-labelling cannot solve the overall R&D deficit between the US and the EU in general, but may explain at least partly the unusual big differences in services' R&D levels between the US and the EU.
- EU trails the US in ICT use in a number of large service industries such as transport and retail. Higher ICT intensity is associated with higher R&D-like activities as ICT are mostly used as a basis for further R&D and innovation. The question is whether this simply is a time lag or whether the rates of returns on ICT investments made in some US service industries are simply higher compared to the EU. It is quite likely to be the latter, but measuring productivity in relation to ICT and services is notoriously difficult. Not least as well established productivity measurements in services are lagging behind this in manufacturing. There is for example a constant discussion how to value quality improvements in services due to ICT.

- In some European countries quite substantial services R&D is performed by manufacturing firms. This may be true in the US as well, but our understanding is that the level of specialisation and outsourcing is higher than in EU. Part of the R&D deficit therefore is a matter of better labelling services R&D in manufacturing in the EU.
- As explained in section 4.3 underreporting of services R&D and more widely measurement problems regarding services R&D obscurers services R&D and its growth. Although it is likely that this is equally the case for the US and EU, it might be good to analyse in a detailed fashion sampling strategies of R&D surveys to assess whether this underreporting is more likely in the EU as compared to the US. Also a detailed analysis over time how more widely formulated definitions of R&D end up in the actual wording of R&D surveys in both the US and the EU is needed.

At the same time, there are a number of trends that will make it most likely that the amount of R&D in BR services in the EU will increase in the year to come and that the gap with the US will be made somewhat smaller:

- Higher exposure to international trade and competition of (at least part of the) business-related services in the EU will imply more incentives to innovate, which will partly translate into more R&D.
- Technology intensity of business-related services is most likely to increase further leading to more (technological) R&D in services, the more so if these continue to grow faster than other service industries.
- Development of larger service firms (consolidation) will lead to more scope for R&D in services.
- The combined trend of specialisation of service firms (niche players), on the one hand, and development of service 'system integrators', on the other, will lead to more services R&D activity.
- Development towards more formalised R&D and knowledge management – as witnessed in the case studies – will possibly lead to more services R&D or at least more reported services R&D.
- Further development and growth of R&D services in Europe will make it easier to start investing in services R&D (and possibly outsource) or invest more in services R&D.
- Services increasingly recognised as important elements in the functioning and innovation dynamics of innovation systems
- New regulation in various fields will trigger service R&D and innovation (as well as in manufacturing)
- The fact that IBM have given rise to a discussion and appreciation of the 'science of services'. This probably is too wide a concept, but it already triggers firms and governments alike worldwide to see how they can invest in services R&D and innovation.
- Coming into being of more service-oriented R&D policies and programmes as well as dedicated services R&D programmes (for an overview see chapter 7).

5 Do service firms benefit enough from public R&D expenditures?

5.1 Introduction

In chapter 4 we have mostly reviewed intramural R&D efforts by services in general and business-related services in particular. As R&D and innovation is mostly a joint effort, and in our view requires a systemic perspective (denhertog, 2000), the ways in which (BR) services are able to tap into external bodies of knowledge, and vice versa, is a key issue when discussion R&D and innovation efforts. This is particularly relevant as there are indications that most national and regional innovations systems, and the actors that populate them, are less well suited to cater for services R&D and innovation needs compared to the case of manufacturing. In this chapter we start by briefly reviewing two mechanisms in which service firms might benefit from public R&D expenditures i.e. through co-operation with the science base (section 5.2) and governmental support for R&D and innovation (section 5.3). Both sections are based on the generic statistical material presented in chapter 2 and some of the case study results dealing with these two pints. We continue by reviewing public support of R&D and innovation in – after providing a brief overview - Germany, the Netherlands, Spain and the UK. In the subsection on German we will also deal on the recently launches 'Innovation with Services' and its predecessors (section 5.4). Further we deal separately with the question how well the European R&D programmes serve business-related services (section 5.5). By way of conclusion we reflect on the question whether there is a need to increase public R&D expenditures aimed at (business-related) services (section 5.6).

5.2 RENESER findings on cooperation with the science base

The statistics as presented in chapter 2 already revealed some facts on the degree to which (BR) service are adopting an external orientation regarding their knowledge sourcing and more in particular have developed links with the public science base. It was concluded that

- For innovation, both manufacturing and service firms tend to draw most heavily on internal sources of information and from 'close sources', such as customers, suppliers and competitors.
- The science base (universities and public research institutes) are less widely engaged (roughly a quarter of innovation active manufacturing and service firms used universities as a source of information for their innovation activities over the period 1998-2000).
- The proportion of firms using these sources appears to vary widely between European countries, and in most but by no means all countries manufacturers are more likely to use these sources than are service firms. However, amongst service firms (technical) business service firms tend to be more likely to use these sources than all services, and indeed manufacturers.

- The proportion of R&D active firms that drew information from the science base was usually higher than the proportion of innovation active firms, suggesting that the conduct of R&D enhances a firm's ability to exploit the knowledge generated by the science base.
- The proportion of innovation active firms with co-operation arrangements for innovation varies between countries, but is roughly 10%. There is mixed evidence whether manufacturers or service firms are more likely to have these arrangements. R&D active firms are more likely to have these arrangements than innovation active firms, again suggesting the conduct of R&D has benefits when it comes to exploiting knowledge generated in the science base (performing R&D as entry ticket for benefiting from co-operation) However, it might equally suggest that for example the science base has difficulty reaching those firms that innovate without formalized R&D capabilities. Amongst services, business services are significantly more likely to have these arrangements than are services in general, suggesting (again) there may be a bias towards co-operations focused on developing technical solutions.

From the case studies as presented in chapter 3 we learned that although the open, collaborative (networked) model of innovation feature quite prominently in most cases, there is considerable room to improve collaboration between service firms and HEI/RTOs in the realm of R&D and innovation as co-operation on services R&D and innovation is mostly poorly developed. Apart from sometimes intense interaction with lead users, co-innovation is quite common with suppliers, other service providers, sales and marketing partners and consultancies. Most cases show rather low levels of interaction with science base (although some exceptions such as the majority of Spanish cases). The HEIs are to an important part seen as places for spotting talent & recruiting staff (and sometimes for getting access to expensive facilities) and more in general as partners for creating an innovation culture. Interest in working more closely with universities and other RTOs on services R&D is limited as these are reported by quite a few of the firms in our sample as mainly focussing on manufacturing and technology indicating that there might be a backlog in adapting to the new service economy reality. What was particularly evident from some of the KIBS in our sample was that this type of mostly advanced services do act as knowledge brokers and innovation intermediaries.

5.3 RENESER findings on governmental support for R&D and innovation

The statistical evidence presented in chapter 2 already indicated that amongst those firms that are innovation active, service firms are less likely to receive support than are their manufacturing counterparts. Thus despite the intention that innovation policies are 'sector-neutral' the reality would appear to be that they favour manufacturers over service-sector firms. This apparent bias in favour of manufacturers appears to exist for programmes provided by individual countries and the European Union, but is most pronounced for support provided by national governments. Amongst innovation active firms, large manufacturing firms are by far the most likely to gain financial support for their innovation activities. They are twice as likely as large service firms to gain this support. This apparent bias towards manufacturing is particularly pronounced in the support received from national governments, although it also exists with the support provided by the European Union, and from local and regional authorities.

Amongst innovation active services, business services are considerably more likely to receive support than are other services. Interestingly, business services were more likely

to receive support from the European Union than were manufacturing firms. Few transport and communication and financial intermediation service firms received support with their innovation activities.

In most EU countries R&D active service firms were less likely to receive support than their manufacturing counterparts. Amongst services, business services were usually more likely to gain support than were other services. In most countries, national support for innovation appears to favour manufacturing firms over service firms amongst those active in R&D, but there is less of an apparent manufacturing bias amongst firms benefiting from support from the EU. In many countries, business services are the most likely to receive support from the EU amongst R&D active firms.

Again, from our set of case studies we learned that most large service firms are not well connected to the R&D and innovation policy scene (unless they perform extensive technological R&D themselves). About half (10 out of 21) of the firms in our sample have participated (ranging from large scale to marginal participation) in (national and EU) R&D programmes. These programmes focused mostly on technological R&D. With some exceptions, the existing R&D schemes are reported to be of limited value to most service firms in our sample. Most cases show either low levels of awareness of and participation in existing R&D schemes (with the exception of the Spanish and some German cases). If they are on the radar they are quite often perceived as hard or unappealing to get access to or participate in. Participation is mostly seen as cumbersome and bureaucratic. Quite a few of the cases included in our sample complain about the information on R&D schemes which is not geared towards service firms and the fact that they mostly do not suit the needs of service firms and industries. Not surprisingly, service firms mention a large variety of innovation and non-innovation policies that could facilitate service firms to become more innovative and eventually more competitive. Increasing competitiveness and regulatory shifts are being mentioned as important drivers for services R&D and innovation illustrating that services R&D and innovation does not necessarily be supported through R&D and innovation programmes.

5.4 Public support of R&D and innovation: some national experiences

5.4.1 Participation in publicly funded schemes to support innovation: an overview[28]

Before discussing the degree to which service firms benefit from public schemes on R&D and innovation, we provide an overall overview of 14 EU countries and the degree to which innovation active manufacturing and service firms participate in publicly funded schemes to support innovation in these countries (see figure 5.1 below).[29] The picture is interesting for various reasons. Firstly, there are countries – Denmark, the UK and Sweden - in which few innovation active firms received any support. In these, the overall proportion of innovation active service firms receiving support is slightly lower than the corresponding proportion amongst innovation active manufacturers. In these countries, however, innovation active

[28]This section is based on Tether (2006).

[29]The two dotted lines on the figure are linear regressions, for the proportion of services receiving support regressed on the proportion of manufacturers receiving support.

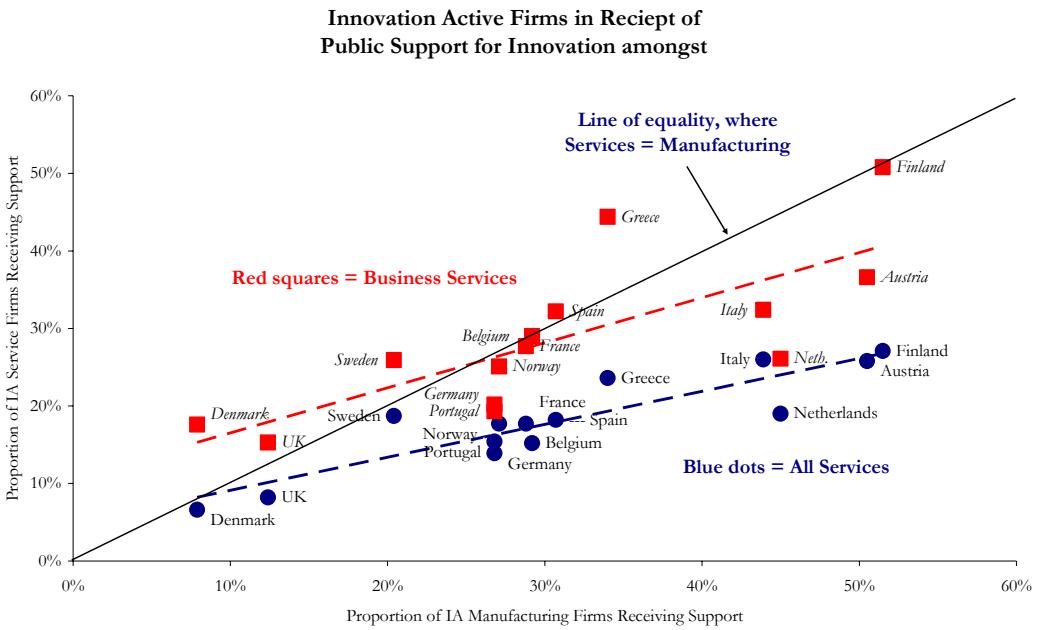
business services are actually more likely to have received support than are their manufacturing counterparts.

There is another group of countries – Italy, Austria and the Netherlands, in which a large proportion of innovation active manufacturers receive public support for their innovation activities. Amongst these, innovation active services in general and business services in particular, are considerably less likely to receive public support for their innovation efforts. Finland is slightly different – whilst overall services are much less likely to receive support, innovation active business services are just as likely to receive support as their manufacturing counterparts.

There is then an intermediate group, which is composed of three sub-sets. First Germany and Portugal, amongst which services in general and business services in particular are less likely than manufacturers to receive support. Secondly, France, Belgium, Norway and Spain, amongst which services in general are less likely to receive support, but within services business services are about as likely to receive support as their manufacturing counterparts. Finally, Greece, which like the other countries is less likely to support the innovation activities of services, but within which business services are actually more likely to receive support than are manufacturers.

This suggests that whilst there is a bias towards manufacturing in the innovation support frameworks, a bias which tends to increase as the proportion of manufacturers supported increases, there is also a difference between business and other services, such that the bias is considerably less pronounced for business services than for other services.

Figure 5.1: Innovation active firms receiving public support for innovation



In the remainder of this section we review to what degree service firms participate in R&D programmes – as far as information on this was available – in Germany, the Netherlands, Spain and the UK. For Germany we have unfortunately not that much information on the degree to which service industries benefit from generic R&D schemes, but this is partly offset by information on the German experience with establishing dedicated services research programmes.

5.4.2 Germany[30]

Research projects funded by the German government are listed in a special online database of the Federal Ministry for Education and Research. A query on “Dienstleistung” (i.e. service) has delivered 784 different projects since 1990 (BMBF, 2006a[31]). An analysis of this data has shown that funded service research projects can be found within a broad range of different research programmes. But besides the activities of the initiative “Services for the 21st Century” (see below) there are only a significant number of service-related projects in the manufacturing research programmes and the IT research programmes.[32] According to the Report of the Federal Government on Research 2004 (BMBF, 2004), there is an overall share of total spending for services-related R&D of 15 %.

On a regional level, some funding activities in the area of service research can be reported from the governments of Bavaria, Baden-Württemberg and North Rhine-Westphalia. But in comparison to the efforts of the Federal Ministry of Education and Research the funding volumes are relatively small and the activities are more focused.

As mentioned, Germany was among the first countries to substantively invest in dedicated services research programmes. The main drivers for these have been the Federal Ministry for Education and Research and the corresponding project management agency “Arbeitsgestaltung und Dienstleistungen“ (i.e. “Development of Work and Services“). They have started their activities in the mid 1990s under the umbrella “Services for the 21st Century”. Until then, there has been no funded institutional service research (e.g. service research centres and university chairs[33]) and only a very few service research projects - mainly in the context of human resource management and quality management - in Germany (BMBF, 2006a). The following phases can be identified:

Phase I (1995-1996): Expert study “DL2000plus”

The intensity of work in this field was only significantly stepped up, however, in connection with the expert study “DL2000plus” funded by the German Federal Ministry of Education and Research. This initiative, co-ordinated by the Fraunhofer Institute for Industrial Engineering, provided a strong boost for the establishment of service research in Germany. More than 300 experts representing business, politics and academia participated in this assessment of the current situation, which was followed by a broad discussion to define those areas of Germany's service sector in which research and further action are required.

Phase II (1997-1998): Priority Measures

In the ensuing years, the German Federal Ministry of Education and Research launched a series of major initiative projects, referred to as “Prioritäre Erstmaßnahmen” (i.e. priority measures), focusing on particularly urgent research topics. The 13 measures of high priority have been structured along the following four research areas (Bullinger, 1998):

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[30] Based on Meiren (2006b).

[31] BMBF German Ministry for Education and Research: Förderkatalog, http://www.foerderkatalog.de, query on May 31st, 2006.

[32] Detailed data about the share of business-related services within these programmes is not available.

[33] The first German university chair on service management (Professor Stauss) was established at the Catholic University Ingolstadt-Eichstätt in 1997.

1. Basic research:

- Trends in services
- Service headquarter Germany

2. New markets and intelligent products:

- innovation management and quality
- service engineering
- trade, distribution, leisure and consumption
- environmental services
- media services

3. Creative organisations:

- new enterprise models
- learning organisations

4. Selected service sectors:

- public services
- communication and financial services
- social and health services
- education and qualification services

Some 320 organisations from the business, public and research sectors participated in this phase of the programme. The 113 specific projects ran for approximately 11/2 years, involving funding support of some € 10 million from the Federal Ministry of Education and Research and the Federal Ministry of Labour, and a total expenditure of € 20 million (DLR, 2004).

Phase III (1998-2005): Programme "Innovative Services"

In 1998, Germany's Federal Ministry of Education and Research (BMBF) responded to the perceived lack of service mentality among the country's businesses and research organisations by launching its first service research programme, thus laying a vital foundation for the comprehensive development of services in Germany. The initiative's key instrument involves promoting ideas, concepts, strategies and models designed to add the necessary new impetus to the successful, stable realisation of the country's potential as a location both for living and for doing business, at the same time securing employment. The overall objectives were (DLR, 2004; BMBF, 1998):

- to support development of the service sector,
- to encourage a more positive attitude towards research and development,
- to provide incentives to private initiative,
- to draw attention to the consequences for training and recognised qualifications and support appropriate,
- implementation strategies, and

- to promote networking with other economic sectors of the economy.

Table 5.1 below gives an overview about the funded research areas and the corresponding funding volumes.

Table 5.1: Research funded through the Innovative Services research programme

Programme »Innovative Services«		
	Duration	*Funding volume*
Benchmarking in order to strengthen innovation, growth and employment in the services sector	1998-2004	€ 8.54 million
Work organisation, management and tertiarisation	1998-2004	€ 24.75 million
Service engineering and service design	1999-2005	€ 16.11 million
Standardisation and quality in the services sector	1998-2004	€ 4.40 million
Stimulation of development of innovative services in the crafts/trades sector	1999-2000	€ 2.81 million
Service co-operation in the crafts/trades sector	2001-2003	€ 3.00 million
Knowledge-intensive services	2000-2006	€ 34.60 million

Source: BMBF, 2004; BMBF, 2005

44.16 percent of the funding volume were spent for business-related services companies.[34]

The latest outcomes of the funded projects can be monitored on the "DL2100" internet platform run by the Fraunhofer Institute for Industrial Engineering (www.dl2100.de). Over 4,000 registered users keep themselves up to date here regarding the content and findings of some 400 current research projects relating to services.

Phase IV (since 2006): Programme "Innovation with Services"

In March 2006[35], the new service research programme "Innovation with services" was launched by the Federal Ministry of Education and Research. It has a budget of € 70 million and a planned duration of 5 years (BMBF 2006b). The main topics of the programme are (BMBF, 2006b):

- Innovation management for services (development of methods and tools, technology design for successful service innovations)
- Innovation in growth sectors of the German economy (business services, services for elderly people)

[34]Analysis of data given from the DLR Project Management Agency. The data includes also the sectors (defined by NACE) that the funded research projects have been addressing. It shows that 60.89 per cent of the research has been done for business-related services.

[35]Although the programme was officially launched in March 2006, there was a pre-programme phase with two funding activities: "Export and internationalisation of services" (25 projects, funding volume of € 20.0 million) and "Integration of production and services" (16 projects, funding volume of € 19.17 million on part of the project management agency "Development of Work and Services"). The latter was the first common activity of the project management agency "Development of Work and Services" and the project management agency "Production and Manufacturing Technologies".

- Human resource management in service companies (work design, “Dienstleistungs-facharbeit”, i.e. skilled service work)

A special focus of the programme is on transfer activities into practice. Moreover, the programme is designed as a “learning programme”, i.e. upcoming calls for proposals will reflect the results of current projects as well as general trends in the service sector.

5.4.3 Netherlands[36]

For the Netherlands the participation of services in three prominent generic R&D schemes has been analysed within the framework of RENESER, notably:

- Research and Development (Promotion) Act (abbreviated as WBSO);
- Innovation Subsidy for Collaborative Projects (IS-scheme);
- innovation vouchers scheme .

The WBSO or Research and Development (Promotion) Act is a tax credit scheme which lowers the tax burden for (mostly) firms employing R&D personnel. R&D is defined as technical/scientific research, the development of technologically new physical products or physical production processes (or parts thereof) and the development of technologically new software (or parts thereof). In 2005, WBSO was broadened. Since then, R&D includes: the analysis of the technical feasibility of an R&D-project; development of technically new physical products, physical production processes, software programmes or parts thereof, and; technical scientific research which can provide explanations for phenomena in areas like physics, chemistry, biotechnology, production technology and information and communication technology. In 2004 the total budget allocated amounted to € 466 million. This is above the actual policy budget available, but as applications have to send in before the actual R&D activities are carried out not all applications granted are used to the full. SenterNovem – the agency responsible for implementing the scheme - regularly reports on the scheme and according to its latest report (2005) over 2004:

- 14.200 WBSO applications were granted amounting to € 466 million
- 13.600 (i.e. 96%) were applications from SMEs (< 250 employees)
- 2.750 applications derived from new applicants (also due to a limited broadening of the scheme e.g. in relation to self employed persons)
- 2.400 applications were from techno starters (who since 2001 are granted a higher tax credit)

From this it is already apparent that WBSO is a massive scheme that is seen and marketed as a scheme that is accessible to many firms. The key criterion is technologically newness to the applicant. This implies that most likely a lot of (technological) innovation diffusion is supported. WBSO reaches the majority of firms performing (technological) R&D. A look at the shares of the three grand sectors in the official R&D statistics and SenterNovem figures on WBSO reveals that manufacturing gets its ‘fair share’, that the category other industries gets more and services less than its ‘fair share’ of the WBSO cake. This leads to conclusion that even if we start from technological R&D, service firms with technological R&D seems not to be completely on par with other industries. Put differently: a scheme that is not particularly designed to facilitate forms of innovations that are more prominent in services

[36] Based on den Hertog & Segers (2005).

also seems to be less favourable to those service firms that actually do perform technological R&D. In 2004 only two service industries ranked among the top-10 industries i.e. computer services (2nd position) and other/remaining business services (8th position). The overwhelming picture is that the distribution of the WBSO budget is skewed, but not surprisingly as the scheme which is said to be generic and accessible to all firm in practice is mostly geared towards supporting technological R&D in manufacturing firms.

Innovation Subsidy for Collaborative Projects or IS-scheme in its current form was created in 2004, but to an important degree was a combination of a couple of predecessors. The scheme involves a subsidy for an R&D project that a company executes together with one or more (national or international) knowledge centres and/or companies. The total budget allocated in 2004 was € 85,2 million. There are four evaluation criteria for R&D projects, namely: technological innovation (1); sustainability (2); collaboration (3) and (4) economic perspective (4). SMEs can also apply for a subsidy on a feasibility study to allow them to first establish the feasibility of a R&D project. The IS-scheme is different from WBSO in various respects. It is about R&D collaboration which is generally seen as a next level in complexity when dealing with R&D and innovation projects, sustainability is a clear criterion and its budget is - although considerable – well below WBSO. However, the technology bias in the definition of R&D applied is similar. Most remarkably is the number one position of NACE 73 which most likely is the result of the fact that the scheme supports collaboration with research institutes and other companies that are registered here as part of NACE 73. So we might also observe here some R&D outsourcing to this 'industry. However, the ranking of the other industries also differ considerably from that of WBSO. If we would exclude the R&D services category as this might be mostly the public institutions funded through the IS-scheme, almost € 23 million of the € 59,5 million is granted to service industries (38%). If we were to include the R&D services industry this percentage would rise to 57% of the total R&D budget associated with the IS scheme.

Based on an early suggestion (July 2004) by the High Level Innovation Platform[37] the Ministry of Economic Affairs launched in September 2004 the innovation vouchers (pilot) scheme[38], which is still experimental. The main objective of this still small scheme is to stimulate SMEs to buy knowledge from knowledge institutes with innovation vouchers and thus to stimulate interaction and exchange between the knowledge suppliers and SMEs (and lower barriers for knowledge transfer). An innovation voucher is worth 7,500 Euro, does not require matching from the SME and can be used by one or a group of SME(s)[39] to buy technological knowledge from (semi-)public knowledge institutes. The knowledge supplier can hand in the voucher with the Innovation Agency SenterNovem and receive payment. In the first round, the 100 innovation vouchers that were available were 'sold out' on the first day as more than 800 applications were received within one day (total 1044). The procedure for awarding the innovation vouchers was that they are awarded per day, until the total budget is depleted (first come, first served). Based on the experiences with the first round, a second round was launched in March 2005 with 400 innovation

[37]The task force "Dynamics of the Dutch Innovation System", one of the task forces of the Innovation Platform, recommended to focus on strengthening the demand side, adjust incentives at the supply side (enhancing demand-orientation), and focusing on direct linkages between demand and supply.

[38]The description of the scheme is largely based on Deuten et al. (2005, pp. 49-50 and 56).

[39]SMEs may bundle the innovation vouchers and submit a joint request for technological knowledge to a knowledge institute. At the time of the first pilot scheme, no conditions were given for such bundling. The pilot round was to shed more light on the way bundling of vouchers would be used. In the second round, 100 of the 400 innovation vouchers were allocated to collaborating SMEs who bundled their vouchers (Deuten et al., 2005, pp. 49-50).

vouchers (worth €7,500 each). Again, the vouchers were sold out on the first day as more than 1700 applications were received. In autumn 2005 a third round was held in which 600 innovation vouchers were handed out. This will mean that in total € 8,25 million will be spend on these three pilot rounds. In 2006 it was decided to make the scheme into a structural policy measure, enlarge the number of innovation vouchers considerably and refine some of the elements somewhat further. As the whole pilot is seen as a learning project the actual use of the scheme was quite extensively monitored and analysed.[40] Services industries participate considerably. 24% of the applicants are from the ' other business services' category (including architects and technical engineering, economic research, advice and PR bureaus), 11% from wholesale and 10% from ICT industries (10%) for example.

In conclusion we observe the following:

1. Three more or less generic (but different) R&D support schemes do show remarkably different rates of participation of service firms. Participation rates of service industries increase going from WBSO (aimed at individual firms with technological R&D) to the IS-scheme (co-operation among firms with technological R&D and/or public research organisations) to innovation vouchers (where individual or groups of firms with or without R&D outsource R&D to public research organisations). This seem to indicate that the criteria for the WBSO scheme might discriminate stronger against service firms than the required forms of co-operation required for the other two schemes. Put differently: do (some) service firms have relatively less difficulty with R&D co-operation and R&D outsourcing and do the strict criteria in terms of technological newness to the firm in WBSO prevent service firms to participate more substantially in WBSO?[41] This leads to conclusion that even if we start from technological R&D, service firms with technological R&D seems not to be completely on par with other industries. A scheme that is not particularly designed to facilitate forms of innovations that are more prominent in services also seems to be less favourable to those service firms that actually do perform technological R&D.

2. Wording of actual R&D schemes is extremely important. The level to which technological newness is used as the sole or most important criterion possible scares off many service firms with especially softer forms of R&D. Scheme which are said to be generic and accessible to all firm are then in practice mostly geared towards supporting technological R&D in manufacturing firms.

3. The additionality of a more demand oriented R&D scheme is remarkable. 52% of the applicants of the innovation voucher scheme (among them many small service firms) did not apply for the most generic R&D scheme WBSO so far. 84% of applicants did not use any of the more specific R&D support and innovation support schemes. In our view this further adds to the idea that this more demand driven instrument can possibly reach those actors that have no experience with more formal R&D support and allows them to outsource some of their R&D that suits their R&D needs. This type of scheme possibly better suits the needs of small service firms and possibly even more if the criteria of the scheme were reformulated a bit as to allow for forms of non-technological innovation as well.

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[40] See den Hertog & Segers (2005) for more detail.

[41] Apart from the second form of 'discrimination' where service firms that do perform technological R&D do benefit less from generic R&D schemes than you might expect on the basis of actual (tech.) R&D expenditures.

4. There is a remarkable spread in participation by various service industries. ICT and business services are among the first service industries to benefit from R&D schemes. Some of the other major service industries are remarkably absent e.g. most financial services. This most likely has to do with the degree to which technological R&D is important and the degree to which these type of industries do interact with manufacturing firms or find it necessary to go to the process of applying for R&D funding.

5. Although there might be quite some turbulence and discussion, the main bodies in R&D support remain quite stable and are hard to change (see WBSO). They have developed a governance structure of their own, have quite a constituency in terms of parties benefiting from these schemes and are therefore hard to change.[42]

In a more speculative vein it is quite well possible that a shift to more programmatic schemes might benefit service firms, as long as these programmes do not solely concentrate on manufacturing and technology. Possibly demand-oriented schemes that do not require prior R&D activities are much better suited to the R&D needs of service firms. At least the innovation voucher scheme – although still a marginal scheme in budgetary terms - showed that there still is an untapped reservoir of R&D needs that thus far mostly has gone unnoticed. Finally, one of the reasons why – although a certain pressure seems to be building up to better facilitate services innovation - policy-makers are a bit hesitant to facilitate service innovation more as they are less familiar with the softer types of innovation, are not convinced that similar market failure arguments apply to these forms of innovation.[43] We will return to these issues when we discuss the rationale for services R&D and innovation policies in chapter 6.

5.4.4 Spain[44]

There is no specific program in Spain aimed at supporting R&D&I activities in the service sector. Therefore, the degree to which service activities benefit from national R&D and innovation schemes can only be deducted from information included in the Reviewed Plan, that it is the main pillar on which the Spanish R&D public policy will be developed. This scheme is integrated by both the National Plan of R&D&I and the INGENIO 2010 Program.

The National Plan of R&D&I is the integrating scheme that defines the main R&D objectives for periods of four years. The last two cover the period 2000-2003 and 2004-2007. The National Plan of R&D&I 2000-2003 for example – which is the overlapping instrument of science and technology policy – aimed at: increasing the level of Spanish Science and Technology (both size and quality), strengthening the competitiveness and innovativeness of Spanish firms and benefit from the results of R&D activities. This program has been articulated around three axes: human resources policies related to R&D activities (1); support of research on the basis of traditional mechanisms and schemes e.g. R&D

[42]The degree to which these schemes are accepted by the 'watchdogs of the treasury' does seem to play a role here as well. This is implies that if a typical ministry of economic affairs is succesfull in making major R&D schemes more sensitive to business services R&D needs that still important parts ouside the immediate control of such a ministry may stay less sensitive address the R&D needs of service firms.

[43]A more practical consideration might be that policy-makers are afraid that their R&D budgets are spread much more thinly.

[44]Based on Narbona & Rubalcaba (2006).

projects(2); and, financing of public infrastructures to be use at launching and developing the research projects (3).

The "INGENIO 2010" Program (2005-2010) was created in 2005 with the purpose of intensifying the public innovation effort and being able to fulfil the Lisbon Objective: to obtain a R&D&I expenditure ratio of 3% of the GDP in 2010, by using three specific45 programmes: CENIT, CONSOLIDER and AVANZ@.

When we focus on the National Plan of R&D&I, it can be linked to service activities such as number of public calls, the employment generated through this (collection of) schemes and the type of firms that benefited from the scheme over 2003. This is the last year on which data are readily available[46].The most relevant selected sectors within the National plan are the following:

- Information and Communication Technologies (ICT)
- Socio-economic
- Information Society
- Transports and arrangement of the territory
- Tourism, leisure and transport.

These five areas include a priori activities of services. They provide us with a rough estimate of the relative importance of R&D projects aimed or at least relevant to services that are financed through the national programs. In 2003, all the performances managed by means of this public support programme have resulted in 16.543 project approved involving € 709 million subsidies and € 864 million in the form of reimbursable credits.

Table 5.2 presents, in percentage terms, the number of R&D projects and subsidies classified by the selected areas, differentiating between those that have been presented and those that have been approved. It can be read as follows: only 47,7% of the total displayed projects in the scientific areas have been granted to R&D projects of telecommunications and 30,4% to socio-economic area. Both areas are the most important groups of this category, having obtained a financing of 14,3% and 16,7% of the demanded support, respectively. Altogether, these two groups represent 12,8% of the total approved projects and 14,4% of the budget granted.

The sum of these five selected sector (ITC, socio-economy, information society, transport and tourism) account for 18% of the total number of R&D projects approved in 2003 and 20% of the total budget granted through the National Plan.

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[45] (1) CENIT: its objective is to increase the public and private cooperation in R&D&I activities. The National Strategic Partnerships of Technological Investigation, co-financed by the public and the private sector (50% each one), will employ 1000 million euros throughout the period of four years. (2) CONSOLIDER: it is a strategic line to obtain the research excellence increasing the cooperation between researchers and forming great investigation teams. It would have a financial dowry of 1500 million euros for all the period, being the 50% a contribution of the Spanish Government. (3) AVANZ@: this is the program to achieve the European average in the Society of Information indicators.

[46] The 2003 Activity Report on R&D&I activities of the National Plan of R&D&I was approved by the Cabinet of Ministers on 29th of April 2005.

Table 5.2: Projects of selected areas, by high-priority areas and national programs (2003)

	Success Percentage		Percentage of the total approved	
	Nº	Subsidy	Nº	Subsidy
ICT	47,7	14,3	10,1	12,5
Socio-economy	30,4	16,7	2,7	1,9
Subtotal scientific-technological Areas	**45,0**	**16,1**	**58,2**	**69,2**
Information Society	40,4	9,1	3,8	3,4
Transports and territorial arrangements	38,6	7,4	1,5	1,1
Tourism, leisure and sport	46,8	23,2	0,5	0,1
Subtotal sectorial Areas	**42,4**	**8,5**	**14,6**	**11,5**
Subtotal non oriented Areas	**56,8**	**43,9**	**27,1**	**19,4**
TOTAL	**47,2**	**16,4**	**100**	**100**

Table 5.3 presents the generated employment as a result of the displayed "R&D projects" and the "specials actions" of the 2003 National Plan of R&D&I. The five selected areas involve a total of 11.381 of researchers (25% women). The telecommunications area is beyond any doubt the most important area employing the largest number of researchers (6.813), involving the largest number of approved projects (645) and takes the lions share out of the available budget (51,769.7 thousands of euros) of the National Plan. Overall only 47,23% of the total of 13.517 handed in project proposals were selected (6.384 project). The rate of success of the five analysed sectors has been very similar (41.85% equivalent to 1.188 projects).

It can further be observed that there is a clear predominance of companies that are not SME which monopolize most of the budget granted. There is only one exception and that is area Information Society, where SMEs predominates. The five thematic areas selected concentrate about 631 participant companies (i.e. the 26,05% of the total), almost half of them being SME (43,4%).

Table 5.4 analyzes the distribution of the approved budgets of the Promotion Program of Technological Research (PROFIT, 2000-2003)[47]. PROFIT is included within the National Plan of R&D&I of the Education, Science and Sport Ministry (MECD). This Program is integrated by the same scientific and areas of the National Plan of R&D&I 2000-2003. It also incorporated other R&D public aids already planned by the Strategic Initiative of the Government for the Development of Information Society (INFOXXI). The key objectives of the PROFIT Program are the following:

[47] The successor of PROFIT is the Promotion Program of R&D&I 2004-2007. The scope of the programme is similar as the National Plan and its fundamental purpose is to contribute to increase and optimise the use of the public and private research infrastructure; to boost and to facilitate the participation of the Spanish companies in international R&D&I cooperation programs; to support the development of any R&D project that increases the technological capacity of national firms; to enlarge the cooperation culture in R&D activities between all the agents of the Spanish System of Sciences, Technology and Enterprise; and, to stimulate the development of R&D projects that take into account energy efficiency, reducing the gas discharges that cause the greenhouse effect.

- To boost the application of knowledge and the incorporation of new ideas in production processes.
- To increase technological absorption capacities of firms and strengthen technology-based sectors, markets and firms.
- To further the competitiveness of the manufacturing sector by developing innovative technologies or diffusion and use of new technologies by firms.
- To foster the integration and the cooperation among the agents of the National System of Sciences, Technology and Enterprise.

Public support offered through PROFIT over the period 2000-2003 amounted to €1,195.4 million. In total 85,9% of the funds distributed funds are reimbursable credits and the remaining 14,1% subsidies. It can be noted that the National Program of ITC accounts for 60% of total support, and the National Program of the Information Society and the Generic Action in the Information Society respectively 13,3% and 10,5% of the PROFIT's budget. Most likely service activities are quite importance in PROFIT. However, there is no indicator available that allows for a more precise estimate of the participation of service firms in this Programme. However, there are also two other programs within the PROFIT Program referred to the Action "Advanced Services of Telecommunications for SME" and to the Strategic Action "Advanced Public Services" whose relative importance is much smaller (€2.272.966 and €3.152.909, respectively). In both cases, it is possible to confirm that they mostly involve activities of services

Table 5.3: Employment and public funding of R&D Projects of selected areas, by high-priority areas and national programs (2003)

		R&D Projects								Specials Actions						
		Nº	Solicited Principal researcher		Subv.	Nº	Approved Principal researcher		Subv.	Nº	Solicited Principal researcher		Subv.	Nº	Approved Principal researcher		Subv.
			Fe-male	Male			Fe-male	Male			Fe-male	Male			Fe-male	Male	
ITC	MCYT-DI	433	642	2.469	69.358,8	244	381	1.560	26.151,4	353	67	297	21.111,8	325	62	274	14.624,2
	MCYT-DP	920	1.854	7.108	293.784,0	401	947	3.925	25.618,3	84	155	360	9.542	54	106	276	2.630
	Subtotal	1.353	2.496	9.604	363.142,8	645	1.328	5.485	51.769,7	437	222	657	30.653,9	379	168	550	17.253,8
Socio-economy	MCYT-DI	302	766	1.228	24.631,7	112	317	508	5.225,6	123	25	99	4.932,0	111	23	89	2.068,1
	MCYT-DP	118	157	328	16.712,2	23	31	62	1.789,8	5	5	5	471,9	5	5	5	204,3
	MTAS-IM	146	671	267	6.755,0	37	184	45	1.015,0								
	Subtotal	566	1.594	1.823	48.098,9	172	532	615	8.030,3	128	30	104	5.403,9	116	28	94	2.272,4
Subtotal scientific-technological Areas	**Subtotal**	**8.260**	**17.503**	**36.642**	**1.779.116,5**	**3.716**	**8.499**	**19.984**	**286.403,4**	**1.490**	**552**	**1.650**	**96.160,2**	**1.255**	**377**	**1.292**	**37.263,1**
Information Society	MCYT-DI	574	1.478	2.961	153.543,2	235	805	1.575	13.768,1								
	MSC-ISCIII	30	77	137	3.514,9	9	37	50	466,5								
	Subtotal	604	1.555	3.098	157.058,2	244	842	1.625	14.234,6								
Transports and territorial arrangements	MCYT-DI	34	28	173	9.087,1	26	24	143	786,8	3	1	10	929,1	2	1	6	293,9
	MCYT-DGDSI	96	124	756	34.265,4	48	82	511	2.841,5	6	8	15	1.229,7	4	4	12	396,3
	MFOM	124	11	113	18.615,6	24	2	22	986,0								
	Subtotal	254	163	1.042	61.968,1	98	108	676	4.614,3	9	9	25	2.158,8	6	5	18	690,2
Tourism, leisure and sport	MECD-CSD	62	58	220	1.200,5	29	34	136	278,2	20	3	17	131,7	11	2	9	60,5
Subtotal sectorial Areas	**Subtotal**	**2.207**	**3.910**	**10.001**	**560.275,2**	**935**	**1.914**	**5.863**	**47.463,7**	**146**	**323**	**428**	**26.433,3**	**72**	**99**	**164**	**5.213,8**
Subtotal non oriented Areas	**Subtotal**	**3.050**	**4.705**	**6.601**	**182.861,1**	**1.733**	**2.926**	**4.331**	**80.259**	**614**	**151**	**465**	**24.514,9**	**547**	**135**	**413**	**10.727,4**
TOTAL		**13.517**	**26.118**	**53.244**	**2.522.252,9**	**6.384**	**13.339**	**30.178**	**414.126,8**	**2.516**	**1.067**	**2.675**	**159.361,2**	**2.090**	**648**	**1.977**	**59.293,0**

Note: MCYT-DGI: Dirección General de Investigación; MCYT-DGPT: Dirección General de Política Tecnológica; MTAS-IM: Instituto de la Mujer

Source: Memoria de Actividades de I+D+I 2003, MECD. Plan Nacional I+D+I.

In 2005, the PROFIT granted subsidies that amounted to a total value of €24.287.556,21 and €237.838.476,39 in reimbursable credits. The total applied budget for last year accounted for around €262 million. According to an own estimate of the Ministry of Industry, Tourism and Commerce, during the year 2005 there was only 97 projects out of 3000 in total can be directly linked to service activities. Therefore, relevance to services is marginal (less than 3% of the projects are associated with services). These projects obtained a total aid of € 4.664.005,59 in form of subsidies and €8.275.984,50 in form of reimbursable credits. These projects concentrated therefore 19% of the subsidies and only 3,5% of the reimbursable credits granted within the framework of this Program. [48]

It was concluded that the Spanish public administration could benefit from deepening its understanding of services and services' R&D. This could result in the creation of instruments that are more geared to the needs of R&D in services, but also help in reorienting existing instruments. The latter would allow for better financing of R&D&I projects flagged by service firms or firms performing service activities (which may involve manufacturing firms). It was further mentioned – by both civil servants and people from industry that a clear identification and systematic recording of R&D in services activities is lacking. This was thought to be needed first, before actually being able to define instruments and schemes that would support R&D and innovation in service activities. Up till now, most of the projects that benefit from public funding are related to industrial innovation activities, i.e. these projects look for the technological development related to new machinery or new components. However, there are not specific actions or policy schemes aimed at the development of new technological services or new services that this new machinery could provide.

[48] €1,195 million is the total amount for a three-year period 2000-2003, and €262 million is only for the applied budget in 2005 and it is included in the whole period 2004-2007 (the exact budget for this period is not known yet).

Table 5.4: Approved Budget Distribution of the PROFIT Program 2000-2003, Selected Programs related with services

Programs	Subventions (DGDSI)	% of the total	Reimbursable credits	% of the total	Total	Subventions (%)	Reimbursable credits (%)
National Program of ITC	98.450.748	58,4	615.359.716	59,9	713.810.464	13,8	86,2
Strategic Action of Technologies and experimental services of broadband	415.900	0,2	20.499.922	2,0	20.915.822	2,0	98,0
Strategic Action of Security in the ITC systems	5.534.153	3,3	14.522.968	1,4	20.057.121	27,6	72,4
Action of Advanced Telecommunications Services for small enterprises	1.911.742	1,1	361.224	0,0	2.272.966	84,1	15,9
National Program of the Information Society	22.482.022	13,3	108.118.285	10,5	130.600.307	17,2	82,8
Strategic Action of e-commerce for enterprises	6.539.492	3,9	89.336.723	8,7	95.876.215	6,8	93,2
General Action for the Information Society	17.641.207	10,5	122.821.210	12,0	140.462.417	12,6	87,4
Horizontal Projects for the support of the development of the Information Society and its culture (special actions)	4.960.153	2,9	3.945.043	0,4	8.905.196	55,7	44,3
Strategic Action of Advanced Public Services	471.193	0,3	2.681.716	0,3	3.152.909	14,9	85,1
National Program of Transport and territorial arrangement							
Strategic Action of integral transport	5.040.087	3,0	31.255.033	3,0	36.295.120	13,9	86,1
Strategic Action of “Intelligent Services Systems of Transport”	5.063.620	3,0	17.976.650	1,8	23.040.270	22,0	78,0
TOTAL	**168.510.318**	**100,0**	**1.026.878.490**	**100,0**	**1.195.388.808**	**14,1**	**85,9**

Source: Consultrans and DGDSI

5.4.5 United Kingdom

Information on the participation of service firms in the UK in R&D and innovation programmes is mainly collected through the UK-version of the CIS-survey.[49] This version is contains a fairly detailed question whether firms benefit from various kinds of R&D and innovation support provided at the various levels (EU, national, regional and local). Some of the (weighted) main findings are:

- 5,9% of all service firms did receive public (innovation) support over the period 1998-2000 (vs. 10,5% of all manufacturing firms)
- 10,8% of all innovation active service firms did receive public support over the period 1998-2000 (16,7% manufacturing)
- For financial support services still lag behind manufacturing– irrespective whether all firms, all innovative active firms – at the national, regional/local levels. The difference at the EU-level is there as well, although less pronounced
- Regarding participation in particular schemes: innovation active services firms score lower on participation in technology development schemes, compared with manufacturing (4.6% vs. 6,4 %) and also lower on participation in schemes aimed at technology acquisition (1,7% vs 3,5%).and slightly lower in European programmes (1,9% vs 2,5% in manufacturing Maybe not that remarkably services are more or less on par with manufacturing regarding their participation in management information programmes (2,2% vs 2,1%, whereas the overall average is 2.4% due to the high participation in the extraction & construction sectors.

There still is a bias in most schemes and at most levels towards manufacturing, but not as drastic as in some other EU-countries and not across the board.

Earlier research as performed by IoIR (see Miles et al., 2003) sheds some light as to how in particular Knowledge Intensive Services or KIS– which more or less coincide with was has been labelled as BR-services in RENESER – are linked to the science base in the UK. This study showed that KIS is typically less linked to the public science base (and to make more use of consultants to support innovation) than manufacturers, but when these links are there quite significant though. We recapitulate some of their key findings here:

- “Both qualitative and quantitative studies indicate that the direct links between KIS firms and the science base are typically not particularly strong ones. The case study research was able to identify some cases of strong links, but these stand out in a sea of weak or non-existent links….In general KIS fare poorly in terms of links with the science base as compared to some other sectors - this is highlighted by the survey results. However, there is a notable exception - enterprises in technical services are among the most intensively linked revealed in survey data.”[50]

[49] The information presented here was provided by Bruce Tether, member of the RENESER project team.

[50] The interview research suggested that environmental services may be prominent here, whereas IT services did not feature such strong links.

- "The survey analysis did suggest, however, that while in general the science base appears to be a secondary source of information and a rare partner in collaboration, when it is being so used, the user KIS is likely to be particularly dynamic. Just because we find fairly few enterprises reporting close links with the science base is a not, then, ground for thinking that these links are insignificant to the innovation process in the UK economy. Add to this, knowledge flows that are mediated via graduate recruitment and through professional and other intermediaries, and the significance will appear as higher still."
- "Lack of relevant knowledge and expertise does not appear to be a major problem for most KIS in the UK: other factors are cited as impeding innovation to a greater extent. However, there are signs that in many dynamic areas, there is a large and possibly growing gap between the knowledge bases nurtured in academia and in the professional world. Whether this is a major problem, a major opportunity, or an ineluctable fact of life in a complex economy is harder to say. Indeed, the answer may vary over time and across sectors. This could be a valuable topic for further research - and for dialogue between KIS and academia."
- "KIS are usually dominated by small firms, though most sectors feature a handful of large companies. The differences between small and large firms were underlined again and again in the study. The problems that small firms have in identifying the potential that the science base could offer their activities were very striking. These are marked even in areas of KIS work where the larger firms are active, and strategically able to recruit graduates and mobilise expertise. The small firms are unaware of government programmes that could help them forge better links (CASE, TCS, LINK, various EU schemes, etc.) It is possible that better and more targeted marketing of such schemes would be more effective than the creation of new schemes and programmes."

5.5 How well do the European R&D programmes serve business-related services[51]

5.5.1 Introduction

During the last few years the importance of the performance of service industries has been increasingly recognised as a key economic driver of competitiveness and innovation in Europe. As a result, and notwithstanding the fact that the number of actions to enhance its economic performance and the attention paid to services in R&D and innovation policies is still rather low, policy attention was certainly on the rise (see section 1.3). In the EU domain a lower integration of services in EU and national R&D programmes can be noticed, particularly those market services attempting to develop non-technological innovations. This type of actions remains quite dependent on R&D and innovation projects in the ICT domain. Further, the EU R&D programmes do target to a considerable degree some non-market services such as education, health, security, etc. Finally, the large increase of the FP7 budget means that there is more room to address service needs. In this section we review the available evidence indicating the degree to which European R&D programmes serve business related services. Earlier we noticed that EU funded R&D is possibly less manufacturing biased compared to especially R&D and innovation support in some countries. We will first assess in still a rather crude way – as more detailed information is

[51]This section is based on Rubalcaba & Gallego (2006).

simply not available – how service-related themes are addressed in EU R&D programmes (subsection 5.5.2). Subsequently, we look into the question to what extent services and especially business-related service categories are benefiting from EU public R&D and innovation support (subsection 5.5.3). At the end we present a few other observations. (subsection 5.5.4).

5.5.2 Service related themes in EU R&D programmes

Once the Single European Act was consolidated in 1987 within the Treaty of Maastricht, the European R&D policy was structured through partly overlapping multi-annual R&D Framework programmes instead of independent programmes focusing on different sets of priority actions and a variety of specific programmes. This is evident if we briefly characterise the subsequent FPs. FP1 (1984-1987) was aimed at organising and administrating the range of independent programmes that appeared during those years (ESPRIT, BRITE, RACE). FP2 (1987-1991) meant a substantial boost for supporting R&D in the energy field energetic as well as the technology-based industries, and was supposed to be an important element in the construction of a European Internal Market. FP3 (1990-1994) meant a transformation on the priority actions and resulted in an increase of the participation of environmental and biotechnological research in European R&D programmes. Between 1994 and 1998, after the Maastricht Treaty and the "White Paper on growth competitiveness and employment" establishment, FP4 was implemented showing high rates of public (continued) funding of R&D in biotechnology and life sciences. This latter Framework Programme received a total of € 13,215 million[52], a huge increase compared to the € 6,600 million destined for FP3. The European Council formally adopted FP5 in November 1998 with a maximum overall budget limit of approximately €15,000 million. It meant a reorganization of European research themes (information technology and environmental areas) and reflected the increasing importance of socioeconomic values. Its specific research programmes were mainly aimed at ensuring quality of life and environmental resources, creating a user-friendly information society, achieving competitive and sustainable growth, and preserving regional and global ecosystems. The present FP6 (2002-2006) reached the contribution of €19,113 million and has taken into special consideration the goal adopted by the European Council in 2000 of creating a European Research Area (ERA) to face the gap between Europe and the United States and Japan in science and technology issues. Themes more related to services mainly include transport and ICT activities. In this sense, and as estimated throughout the FP6 analysis, the low investment levels in non-technological business-related services projects are evident. As far as these are covered, they depend to a large extent on ICT R&D projects. FP7 is supposed to reach the overall amount of €53,272 million for the period 2007-2013[53]. However the role of services-related funding is mostly indeterminate. Taking into consideration the significant budget devoted to ICT activities (€9,110 million) and the existent link between services and this sort of activities, it is supposed that business-related services innovation projects will benefit at a higher extent from FP7 EU funding. Nevertheless, the weight of BRS funding, other than ICT projects, is largely uncertain.

Table 5.5 below provides an overview how the various themes within the various FPs have developed both in terms of number of projects and budgets. Thereby, although in terms of

[52] ECU up to 31.12.1999.

[53] The 53,272 million euro total budget includes two main parts: 50,521 million euro for research and development of non-nuclear actions to be developed between 2007 and 2013, and 2,751 million euro for nuclear research and training activities to be concluded in 2010.

production and employment, the tertiary sector keeps a capital importance within the European Union, it seems that services have been relatively less integrated than industry sector within the science and technology policy scenario. This fact may have its origin on the prominent position that industry in general, and manufacturing in particular, has taken in the European context concerning R&D and innovation policies. Apart from the significative role that transport initiatives have played in the different FPs, it is rather difficult to find any other programmes directly associated with the services sector . In this respect, direct business-related services schemes, as assessed in table 5.5, has been mostly overlooked. Nevertheless, it seems that over the last years, the indirect participation of services in this sort of EU economic policies is being increased, mostly through the increased importance of horizontal and ICT support programmes.

Table 5.5: Topics and budget covered through the FPs by industry orientation

	4th FP		5th FP		6th FP		7th FP	
	Number of topics	Budget (million ecu)	Number of topics	Budget (million euro)	Number of topics	Budget (million euro)	Number of topics	Budget (million euro)
Thematic areas	18	13,215	24	14,960	15	19,113	19	53,272
Mainly horizontal oriented	3	1,719	7	3,915	4	5,445	9	18,229
Mainly agriculture and fisheries oriented	1	739,5	1	520	0	0	0	0
Mainly industry and energy oriented	6	4,795	2	1,874	3	3,549	4	11,341
Mainly health and biotechnology oriented	2	969,5	3	990	3	3,267	2	7,919
Mainly transport oriented	1	263	3	1,391	2	1,852	1	4,180
Mainly environment oriented	1	914	2	1,390	1	769	1	1,886
Mainly ICT oriented	3	3,668	5	3,600	1	3,984	1	9,110
Mainly other business-related services oriented	0	0	0	0	0	0	0	0
Mainly socio-economic research oriented	1	147	1	1,280	1	247	1	607

Source: Based on New Cordis database

Note: Total budget includes that devoted to Euratom Framework Programme

In order to obtain a better understanding of how business-related services alone and their particular innovation activities are represented in FP6, an overall analysis of the projects included in three different FP6 action areas, that are at first sight relatively more services-related, was performed. Four different modalities or action instruments were included: Integrated Projects, Specific targeted research projects, Specific targeted innovation projects, and Coordination projects. Much more emphasis has been put on those attempts carried out by the European institutions (universities, enterprises, research centres, etc.) to reach non-technological innovations (organizational systems, software, processes, etc.), this is, those more related to business services activities. In this sense, technological advances developed by services industries were thought to be excluded from this analysis.

The results are given in table 5.6. Out of the total number of 1,538 projects financed through the four instruments, 180 (12%) are thought to be addressed mainly to horizontal

actions[54], and 763 (50%) to industry-related and technological innovation actions[55]. The rest of the projects (595) have been put apart considering their potential connection to business-related services innovations. Then, taking into account the specified criteria, it has been estimated that among these 595 projects, just 54 (i.e. 9%) might be linked to business-related services, most of them (95%) integrated in the IST field. These 54 projects represent 3.5% from the total number of projects regarding the four chosen action instruments.

Table 5.6:Estimate of the number of business-related services projects in FP6

	Total	Mainly horizontal	Mainly industry related	Information society technolo-gies	Research for policy support	Research and innovation
Integrated projects	366	6	222	137	1	0
Specific targeted research projects	929	97	462	270	100	0
Specific targeted innovation projects	19	1	11	2	5	0
Coordination actions	224	76	68	47	22	11
Total	1538	180	763	456	128	11
Mainly business-related services projects	:	:	:	**54**	**0**	**3**

Note: Those innovation activities addressed to sectors like health, learning, gaming, public administration, media, and security were decided to keep out from this approach, trying to deal just with business-related services innovations.
Source: Estimates based on New Cordis database

A selection of these business-related services projects are displayed in the table 5.7 below. It can be observed that despite the great response obtained through FP6 in terms of organisations reached, there seems to be a lack of funding for non-technological business-related services projects which are still mostly hidden in the ICT domain.

A more detailed look at FP7 reveals that “The 7th Framework Programme is characterised both by continuity with the current FP6 (e.g. in the context of the collaborative research) and the introduction of novel elements at the level of content and instruments to address the arising needs at EU level (e.g. support to new infrastructures, co-ordination of national research programmes on a large scale, Joint Technology Initiatives, European Research Council)” (European Commission, 2005c):. In this sense, the 7th Framework Programme will continue to support the realisation of the European Research Area, as occurred during the FP6, but it also stresses to a much higher extent on research themes in those areas where the EU should strengthen its knowledge base for growth. The main goals pursued through FP6 are generating an important boost on public R&D spending in the EU25 as a

[54] This integrates eight different activity areas: Citizens and governance, Specific SMEs activities, International cooperation activities, Joint research centre, Coordination of research activities, Marie Curie actions, Research infrastructures, and Science and society.

[55] This integrates nine different activity areas: Life sciences, genomics and biotechnology for health, Nanotechnologies, materials and new processes, Aeronautics and space, Food quality and safety, Sustainable development, Global changes and ecosystems, New and emerging science and technology, Management of radioactivity waste, Radiation protection, and other technologies in the field of nuclear technologies and safety.

percentage of the GDP. This should provide a strong push for member states to boost their efforts and to drive private organizations to increase their investments on R&D[56].

Table 5.7:Examples of business-related services R&D projects funded through FP6

Acronym	Proposal	Project Cost (million euro)	EU Funding (million euro)
CASCOM	To implement, validate, and trial value-added support to business services for mobile workers and users across mobile and fixed networks	3.67	2.69
HIGHWAY	To offer higher safety and location-based value added services where interactions between the person in control, the vehicle and the information infrastructure are addressed in an integrated way	3.02	1.62
XBRL	For identifying and better communicating the complex financial information in corporate business reports making the analysis and exchange of corporate financial information easier and more reliable, providing benefits to all members of the financial information supply chain	0.99	0.99
MYCAREVENT	To develop and implement new applications and services in the After Sales Market of the European Automotive Industry, which can be seamlessly and securely accessed by mobile devices. To introduce innovative mobile applications will enable new ways of working and collaboration among car manufacturers, workshops, road assistance services and the customer, who will all benefit from this	16.02	10
SENSORIA	To develop a novel comprehensive approach to the engineering of software systems for services-oriented overlay computers where foundational theories, techniques and methods are fully integrated in a pragmatic software engineering approach	10.37	8.15

Source: Based on New Cordis database

The new FP7 integrates four principal objectives, being supported each one by its own programme:

- Ideas: it is to stimulate the inventiveness and excellence of European research through team competition in all scientific and technological fields, including engineering, socio-economic sciences and humanities.
- Cooperation: its main objective is to support the establishment of higher cooperation levels among public and private authorities and organizations across the EU, as well as with the rest of the world, in order to better exploit the accomplished knowledge.
- People: supporting the career prospects and mobility of researchers in Europe.
- Capacities: enhancing the European innovation scope through better research infrastructures, higher regional cooperation and more innovative SMEs.

The cooperation programme deals with more than half of the total budget (€32,292 million) and it is divided into nine different EU actions, most of them meaning a

[56]It is assumed that one euro of public R&D leads to 93 eurocent business R&D investment (European Commission, 2005b).

continuation from the FP6. Two particular features from the FP7 stand out and are different from the previous one. The first of these is the inclusion of an action plan for socio-economics sciences and humanities, which accounts for about 1% of the total FP7 budget. The second deals with the share of funding devoted to ICT research. For the later €9,110 million or 17% of the whole FP7 budget are reserved for this theme. Taking into account the significant link between services activities and ICT this would imply a considerable increase in the number of business-related services innovation projects that will benefit from EU funding. In fact, ICT[57] are understood as the most significant instrument in enhancing innovation and creativity across industry and services sectors, and in modernizing services in different areas such as education, learning, security and transport.

5.5.3 Business-related services firms receiving public funding

OECD has recognised in the document "Promoting Innovation in Services" (October 2005) the lower use of public funds by services firms compared to goods enterprises. But the position of governments in countries like Sweden, Finland, Norway and Germany, where specific services programmes have been launched to promote R&D and innovation in this sector, is a clear signal of a attempts being made to steer towards a more dynamic and innovative services economy.

Below we present some detailed analyses using the "public funding of innovation" indicator obtained from CIS3.[58] This will shed some light on the overall share of services firms receiving public funding, the distribution over the various sources of this support (local or regional authorities, central government, EU, or 4FP and 5FP) and the way four BR-services perform on this indicator. Data are provided for 14 EU-countries, Norway and Iceland.

Share of innovative services sector firms receiving public funding

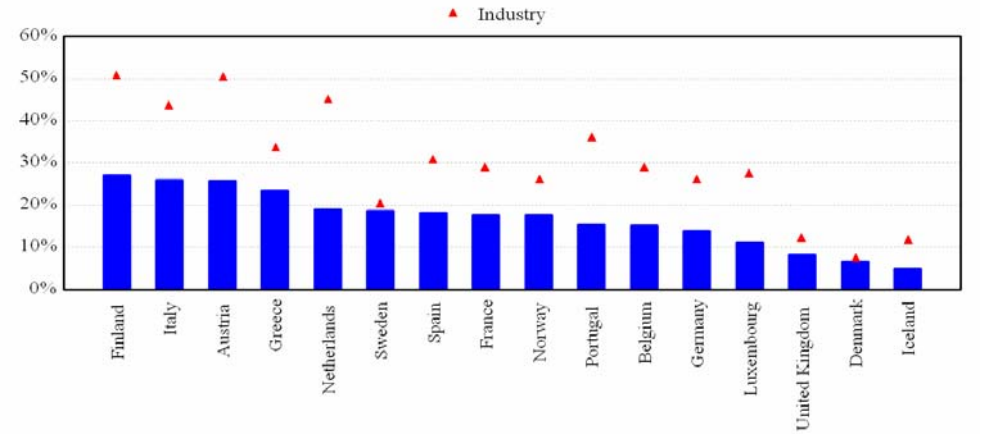
As mentioned previously, innovation survey data indicates that the share of services sector firms benefiting from public funding for innovation funding is considerably lower than in the industry sector (manufacturing, energy and mining). That difference, as observed in figure 5.2, is particularly relevant in countries like Finland, Austria, The Netherlands, Portugal, Luxembourg, and Iceland where the share of industry firms receiving public support is in some cases more than double the share among services firms. This phenomenon is mostly due to the encouragement of industry innovation support provided by central govern-

[57] ICT are considered to be the core element for reaching the realisation of the Lisbon agenda. Despite Europe is already leader, in terms of technology, in some key ICT fields, it lags in investing in ICT research behind its major competitors. It is supposed that half of the productivity gains in the European economy are determined as a result of the effects of ICT on products, services and business processes (European Commission, 2005c).

[58] CIS3 offers information on innovation activity at enterprise level in 2000. It shows the European progress in the area of innovation, creating a better understanding of the innovation practices and analysing the effects of innovation on the economy (such as competitiveness, employment, economic growth, trade patterns, etc.). The statistical unit is the enterprise and the survey gives some more information about the type of innovators they are. The classification used divided companies among enterprises with innovation activities, novel innovators, product and/or process, novel innovators, product only, novel innovators, process only, novel innovators, product and process innovators, establishes innovators, ongoing and/or abandoned only. As a second type of enterprises classification, the size has been used. Therefore, according to the number of employees, the companies can be studied in more detail among "Between 10 and 49 employees-enterprises", "Between 10 and 249 employees-enterprises", "Between 50 and 249 employees-enterprises" and "250 or more employees-enterprises".

ments. In spite of this, it is significant that, for example in countries like Sweden and Denmark, the levels are quite similar for both the industry and services sector (20.31% vs. 18.67% and 7.71% vs. 6.57% respectively). In some north European countries like United Kingdom, Denmark and Iceland the rate of services enterprises receiving any institutional funding is rather low (8.19%, 6.57% and 4.89% respectively), in contrast to the levels appeared in most southern members (Italy 26.01%, Greece 23.55%, and Spain 18.18%).

Figure 5.2: Share of innovative services firms receiving public funding



Source: Based on Eurostat database

Various categories of public funding

Table 5.8 shows the superior funding of manufacturing to services in almost all countries. This phenomenon is observed when looking at the variables: funding from central governments and funding from local and regional authorities. However, dealing with the funding from the EU and the public support from the 4th and 5th FPs, there is more variety. In Greece, for example, 14.50% of service firms receive financial support through FP4 and FP5 compared to only 8.93% in manufacturing. What it is also to comment is the diverse ways for services firms to obtain public support in the different countries. From table 5.8 it can be observed that e.g. 27.08% of innovation active service firms in Finland received public support, the highest share among the countries included here. Especially the share of service firms receiving support for R&D and innovation from the central government levels is quite high in Finland (23.21%). This share is also substantial in countries like Norway (14.44%), Austria (15.19%), Greece (15.50%) and the Netherlands (15.85%). In contrast, in countries like Italy and Spain the services firms are more likely to be supported by local and regional authorities (15.72%, 14.63% and 13.84% respectively) probably due to higher extents of government functions decentralization. From an EU funding perspective, Greece (17.03%), Portugal (11.16%), and Italy (7.38%) are those countries where a higher share of service firms benefit from public support. Austria itself seems to show a particular behaviour compared to the rest of member states because significant support is provided from more than one funding source: 14.63% of services enterprises receive financial investment by local and regional authorities, 15.19% by central government, 6.98% by the European Union and 6.29% through both FPs.

Table 5.8:Share of innovative firms receiving public funding over the period 1998-2000 (in %)

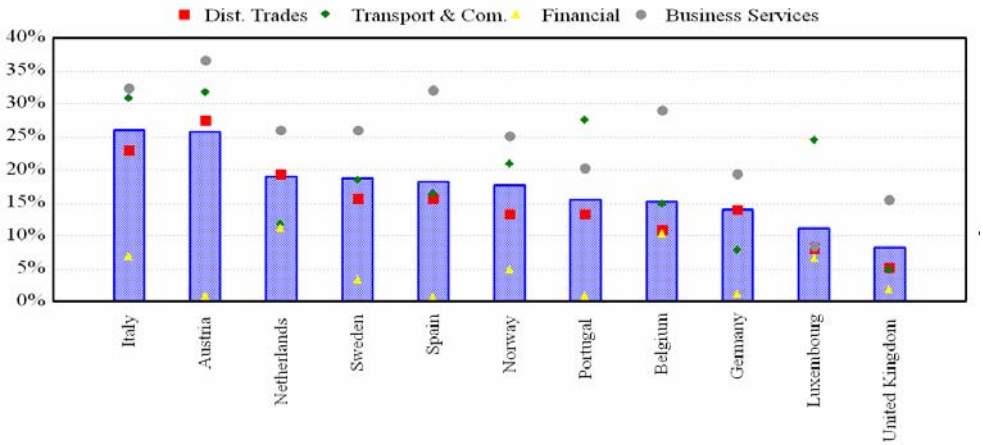
	Public funding		Funding from local and regional authorities		Funding from central government		Funding from the EU		Funding from EU's 4th or 5th RTD	
	Services	Indus-try	Services	Indus-try	Services	Indus-try	Services	Indus-try	Services	Indus-try
Austria	25.76	50.61	14.63	25.31	15.19	39.20	6.98	15.29	6.29	8.36
Belgium	15.19	29.22	10.20	24.21	5.23	4.36	3.21	4.73	2.06	1.69
Germany	13.91	26.42	10.10	15.78	5.41	14.35	2.14	5.70	2.06	3.19
Denmark	6.57	7.71	:	:	:	:	6.57	7.71	3.57	4.81
Spain	18.18	30.88	13.84	22.86	6.30	11.78	3.48	4.82	3.28	1.82
Finland	27.08	50.83	3.05	8.91	23.21	45.41	6.00	8.10	1.87	5.64
France	17.68	28.94	7.13	10.42	12.49	23.91	6.70	6.29	3.81	2.98
Greece	23.55	33.94	2.61	3.74	15.50	17.04	17.03	16.08	14.50	8.93
Iceland	4.89	11.93	0.55	:	3.85	10.17	2.14	3.14	2.14	2.67
Italy	26.01	43.82	15.72	24.92	7.85	20.22	7.38	6.90	3.07	2.65
Luxembourg	11.17	27.46	0.49	1.30	9.24	26.73	2.74	2.05	1.44	2.21
Netherlands	18.97	45.15	3.35	4.77	15.85	40.52	3.58	5.42	1.92	2.16
Norway	17.66	26.18	2.85	3.41	14.44	23.28	1.53	2.43	2.43	2.87
Portugal	15.42	36.28	0.12	2.24	7.73	15.33	11.16	26.09	6.71	18.20
Sweden	18.67	20.31	8.50	7.73	3.71	3.59	7.31	9.61	8.49	9.25
United King.	8.19	12.51	:	:	:	:	:	:	:	:

Source: Based on Eurostat database

Picture for four BR-services

As can be observed in figure 5.3 below in almost every country the higher shares of public funded services firms are related to business services sector. Portugal and Luxembourg are the exceptions to the rule, where a more significant weight is given to transport and communication firms. In the case of Portugal, this financial support provided to the transport and communication sector comes mainly through EU-support, meanwhile in the case of Luxembourg the central government represents the principal source of funds.

Figure 5.3:Share of innovative services firms receiving public funding



Source: Based on Eurostat database

However, in general terms, though it can be appreciated some changes in the proposed statement, the relative order of importance that the different authorities give to the different services sectors according to the share of organizations receiving public funding is: 1. Business services, 2. Transport & communication, 3. Distributive trades, and finally 4. Financial services. Considering this latter sector it is to notice the relevance that it receives in countries like The Netherlands, Belgium and Luxembourg (Benelux area) where financial activities are supported at a similar extent as transport and communication firms or distributive trades. The share of distributive trades (27.52%) and transport and communication companies (31.73%) getting public support aimed at innovation is especially important in Austria, mostly supported through policies launched from the central government and local and regional authorities. On the other side, the share of business services funded by public official bodies is relatively high in Spain and Belgium, where this support is mainly provided by local and regional authorities.

If we combine the BR services sectoral perspective, the funding source and country we derive at the picture as given in table 5.9. From the point of view of EU funding towards services enterprises two points stand out. Firstly, the high number of business services receiving public support. It may be stated that EU financing is to a large extent aimed at business services in most countries, though in countries like Austria, Finland and Luxembourg the share of transport and communication companies getting EU support is more substantial. Secondly, services firms in Greece and Portugal have benefited more from EU funding in comparison to the rest of countries. The percentage of business services being funded by EU in these two mentioned member states is quite high, reaching up to the 29.81% and the 17.08% respectively.

Table 5.9: Percentage of services firms receiving public funding from EU in the different business-related services sectors (in %)

	Total	Distributive trades	Transport & communication	Financial services	Business services
Austria	6.98	8.28	12.03	0.10	7.46
Belgium	3.21	1.84	0.10	10.41	8.07
Germany	2.14	1.02	0.71	0.86	3.93
Denmark	6.57	2.26	7.57	0.10	17.58
Spain	3.48	1.36	1.29	0.10	11.99
Finland	6.00	1.27	10.80	:	8.59
France	6.70	4.93	:	:	10.67
Greece	17.03	11.40	14.06	:	29.81
Iceland	2.14	:	:	:	:
Italy	7.38	5.74	5.49	4.27	11.31
Luxembourg	2.74	0.10	8.44	0.10	4.06
Netherlands	3.58	3.17	1.67	1.21	6.76
Norway	1.53	0.10	3.00	0.10	3.25
Portugal	11.16	13.25	5.14	0.10	17.08
Sweden	7.31	6.39	0.68	1.15	12.50

Source: Based on Eurostat database

Rubalcaba and Gallego (2006) in their topical paper have performed some more detailed analyses. On the basis of these they concluded that:

- The enterprise size, country and the dichotomy services/goods variables have a key role in explaining the use of public funding, while no significant double or triple interactions seem to occur among them.
- There is a preliminary association between innovation performance and total public funding, which seems to be more significant in manufacturing than in services firms. [59] Regarding EU funding, the poor significant associations for business-related services are to some extent more relevant in comparison to those in the industry sector. These associations, if appeared, may be the result of three possible causes. Firstly, investment on R&D may keep positive effects on innovation, this is, more public funding may lead to major innovative outcomes within the private sector. Secondly, the overall better innovative performance of enterprises may influence the capacity to apply and obtain higher levels of public support. Thirdly, associations may not to be consequence of causality.

5.6 Summary: do (business-related) service firms benefit enough from public R&D expenditures?

The systemic approach used in this chapter has been useful to analyse whether services firms, and business-related services in particular, benefit enough from public national R&D programmes either by cooperating with the science base or by obtaining public funding. The main findings are the following:

[59] In fact, total public funding has positive strong correlations (at 1%) with the whole of the variables representing innovation accomplishment in the manufacturing sector, while regarding BRS, these correlations are only manifested in three of the analysed variables, and not at the highest level of significance (only at 5%). (see Rubalcaba and Gallego, 2006, p. 34)

- From a services perspective industry-science cooperation schemes have not been developed enough among the European countries, i.e., they generally do not offer that much for services companies (except for business services).
- There is the possibility to improve this situation via three mechanisms: i) to ameliorate the proportion of innovation active firms that drew information from the science base as R&D active firms used to do, and ii) to boost collaboration between service firms and HEI/RTOs in those countries where these sources are less used; iii) to shape R&D programmes to the specific needs of business-related services.
- It is widely recognised that governmental support for R&D&I activities, both at national and at European levels, has been traditionally focussing on manufacturing firms. Services firms are less likely to receive this kind of public support compared to their manufacturing counterparts. Therefore, there is a clear need to increase public funding to this kind of companies.
- Nevertheless, there is much heterogeneity among European services firms and countries, and it is easy to identify different scenarios with specific necessities. Business services again benefited most (among services firms) from these programmes. This is mainly due to the role of ICT services and consultancy services benefiting to a large extent from the support related to the information society. In any case, empirical evidence for the selected four countries (Germany, Netherlands, United Kingdom and Spain) nicely illustrates the mixed picture.

    1. **Germany** was one of the first European countries to substantively invest in dedicated services research programmes. “Services for the 21st Century” is the German Federal initiative established in the mid 1990s for funding services R&D&I activities. 44,16% of the total public funding in this programmes was spent on business-related firms. In March 2006, the new programme “Innovation with services” was launched with an initial budget of €70 million for a five year period.

    2. In the **Netherlands**, services firms can in principle participate in most generic R&D programmes. However, there is no specific public R&D programmes for them. For instances, the budget of the largest R&D support scheme i.e. Research and Development Promotion Act (WBSO, €466 million in 2004) is clearly skewed towards manufacturing firms. In 2004 almost 36% of the Innovation Subsidy for collaborative projects (IS-scheme, €23 million) is granted to service industries for developing their R&D collaboration projects. Additionally, services industries participate considerably in the newly introduced innovation vouchers scheme, being the 24% of applicants ‘other business services’ category firms. In conclusion, these three generic R&D programmes show remarkably different rates of participation of service firms.

    3. Service R&D activities in **Spain** do not benefit from a specific public support program although it can be identified a selected sectors (ICT, socio-economic, information society, transports and arrangements of territory and tourism, leisure and transport) that participated in the Reviewed Spanish R&D&I Plan (the National Plan of R&D&I plus the INGENIO 2010 Program). The 2003 National Plan of R&D&I granted with €1.573 millions 16.543 R&D projects in these five areas. In 2005, the PROFIT Program only cover 97 projects directly linked with service activities. The Spanish government could benefit from deepening its understanding of services R&D as well as from the creation of new specific public support programmes for innovative activities in services companies.

4. In **United Kingdom** there still a bias towards manufacturing firms in the R&D public support schemes but not as important as in other European countries. Over the period 1998-2000, 5,9% of all service firms received public funding for developing their R&D activities.

- The national cases well illustrate that in general terms, services firms consider their participation in national R&D programmes as cumbersome and bureaucratic. This should be the first issue to deal with. Public R&D programmes should become easier from an administrative point of view and should be reoriented in such a way as to be iseful to more specific service firms as well. It would be necessary to increase the specific financial support for service firms performing R&D in most of the European countries but taking into account the differences just pointed out. Nonetheless, services firms have also mentioned a large variety of innovation and non-innovation policies beyond the R&D public support programmes that could facilitate them to become more innovative and competitive.

In conclusion, generally speaking, there are no clear or specific programmes to promote R&D in business-related services, while national programmes are very heterogeneous and the place for services in each program is very diverse. The strong technological-industrial-goods orientation of current programmes is obviously everywhere. However, the emerging initiatives, such us the German one (as well as in mostly Nordic countries), indicate that there is room for specific programmes related to services. The importance of business services innovation is gaining recognition. Therefore, it is expected that the door is more open for business-related services R&D topics and higher rates of participation of manufacturing and services firms aiming at performing service innovation.

6 Is there a rationale for services R&D and innovation policies?

6.1 Introduction

For a long time, policies aimed at facilitating R&D and innovation have explicitly or more implicitly focused on supporting technological R&D and technological innovation in mostly manufacturing firms. Increasingly so the importance of services, services R&D and service innovation for innovation, growth and employment are being recognised. Although it is well known that service innovation is driven by much more than R&D alone[60], R&D is relevant in many service firms as well. Some service categories have technological R&D investment levels comparable with manufacturing[61], other service firms benefit from technological R&D performed by others[62]. In addition non-technological R&D is relevant for innovation in both services and importantly so manufacturing.

However, in practice there are indications that most (but not all) service firms do still only marginally if at all participate in current technological R&D and innovation programmes[63] and are not that well addressed by wider innovation policies. Policies and programmes seem to be developed mostly with manufacturing and technological R&D and innovation in mind. The number of more dedicated services R&D and innovation programmes aimed at services are limited and the exception rather than the rule. Some examples are included in box 6.1 below.

This is not to say designing and implementing dedicated services R&D and innovation schemes is the only way to address services innovation. As we will argue later on services innovation can be facilitated through many other policies, including 'non-R&D' and in fact 'non-innovation' policies. However, it does raise questions regarding the policy rationale for R&D and innovation policies. The main issue at stake is whether the rationale for policies aimed at (also) facilitating R&D in services (or for that matter service R&D in manufacturing) is any different from that of regular R&D policies? Relevant questions that need to be answered include:

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[60]The same accounts for innovation in manufacturing as for technological innovation to succeed they often need to be combined with new concepts, new ways of interacting with clients and new service delivery organisations.

[61]Or even above it such as in some business services and in particular R&D services, for the latter see Howells (2006).

[62]In fact major firms with a manufacturing background are developing into service solution provider and are among the first to invest in services R&D in a more formalised way. The topic of services R&D and innovation as realised by what we have labelled as hybrid firms is discussed in Meiren (2006a).

[63]This is discussed in various RENESER papers looking into participation of service firms in national R&D programmes in respectively the Netherlands, Spain and Germany (see den Hertog & Seegers, 2005; Narbona & Rubalcaba, 2006;Meiren, 2006b) and in EU R&D programmes (Rubalcaba & Gallego, 2006). See also den Hertog & Segers (2003).

1. To what extent is there a manufacturing bias in R&D and innovation policies, and is this justified by economic realities?
2. How far do notions such as market failure cast light on problems of services R&D and the rationale for policy interventions here? Can we for example expect similar spillovers from services R&D as from R&D in manufacturing firms?
3. Are there arguments beyond market failure that are relevant here - for instance, to what extent can systemic failures be identified that apply to services R&D?
4. What policy approaches to services R&D and innovation are available, and to what extent do we need specific services R&D and innovation policies?

These four questions will be dealt with in sections 6.3-6.6 respectively. We will first in section 6.2 briefly define three basic approaches to services that in our view are essential to understand before discussing potential policies to facilitate services R&D and innovation.

We would like to express here that the aim of the chapter is to open up and contribute to the debate on the rationale for a services R&D and innovation policy that is currently taking shape at both the EU-level and in various national capitals. This by definition means exploring the validity of especially the market failure and systemic failure argumentation in relation to services R&D and innovation. However, there is a considerable discourse in both academia and policy circles about these notions which is beyond the scope of this chapter. Dealing with these more properly would require a dedicated project.

BOX 6.1: THE EXCEPTION TO THE RULE: SOME SERVICES R&D AND INNOVATION SCHEMES[64]

There are few R&D programmes which have a specific services orientation, including:

Germany

The main drivers for publicly funded service research in Germany have been the Federal Ministry for Education and Research and the corresponding project management agency “Arbeitsgestaltung und Dienstleistungen“ (i.e. “Development of Work and Services“). They have started their activities in the mid 1990s under the umbrella “Services for the 21st Century”. Until then, there has been no funded institutional service research (e.g. service research centres and university chairs) and only a very few service research projects - mainly in the context of human resource management and quality management - in Germany (BMBF 2006a).

Phase I (1995-1996): Expert study “DL2000plus”. The intensity of work in this field was only significantly stepped up, however, in connection with the expert study “DL2000plus”. This initiative provided a strong boost for the establishment of service research in Germany. More than 300 experts representing business, politics and academia participated in this assessment of the current situation, which was followed by a broad discussion to define those areas of Germany's service sector in which research and further action are required.

[64] To an important part based on the unpublished Annexe VII of PREST, TNO, SERVILAB, ARCS (2006), The future of R&D in services: implications for EU research and innovation policy, Brussels, European Commission DG Research (S&T Foresight Unit) Directorate K Unit K2; EUR 21959 ISBN 92 79 01209 6. Ian Miles was main author of this report. The description of the German and Finnish programmes was updated.

Phase II (1997-1998): Priority Measures. In the ensuing years, the German Federal Ministry of Education and Research launched a series of major initiative projects, focusing on particularly urgent research topics. 13 measures of high priority have been structured along four research areas. 113 specific projects ran for approximately 11/2 years, involving funding support of € 20 million in total (DLR 2004).

Phase III (1998-2005): Programme "Innovative Services". In 1998, Germany's Federal Ministry of Education and Research (BMBF) responded to the perceived lack of service mentality among the country's businesses and research organisations by launching its first service research programme, thus laying a vital foundation for the comprehensive development of services in Germany. The initiative's key instrument involves promoting ideas, concepts, strategies and models designed to add the necessary new impetus to the successful, stable realisation of the country's potential as a location both for living and for doing business, at the same time securing employment. 44.16 percent of the funding volume were spent for business-related services companies. The latest outcomes of the funded projects can be monitored on internet (www.dl2100.de).

Phase IV (since 2006): Programme "Innovation with Services" In March 2006, the new service research programme "Innovation with services" was launched by the Federal Ministry of Education and Research. It has a budget of € 70 million and a planned duration of 5 years (BMBF 2006b). The main topics of the programme are (BMBF 2006b):

- Innovation management for services (development of methods and tools, technology design for successful service innovations)
- Innovation in growth sectors of the German economy (business services, services for elderly people)
- Human resource management in service companies (work design, "Dienstleistungs-facharbeit", i.e. skilled service work)

A special focus of the programme is on transfer activities into practice. Moreover, the programme is designed as a "learning programme", i.e. upcoming calls for proposals will reflect the results of current projects as well as general trends in the service sector.

Finland[65]

The growing role of services in economy forms the background of the Finnish Services R&D and innovation schemes. Three trends describe the growing importance of services in more detail. Firstly, services are an important contributor to the economic and employment growth. Services count (on average) for 70 % of GDP and total employment in OECD countries. Secondly, business services are becoming increasingly significant in manufacturing industries. Services generate an increasing share of the revenue flow and a more stable revenue flow than products alone, so services are less vulnerable to economic cycles (e.g. in the manufacturing context). Thirdly, knowledge intensive services or activities, such as research, development, consulting, engineering & business services are becoming more important in the business life cycle.

Service firms are taking a more central role in innovation in national and international innovation systems, which increases the need for innovation policies aimed at service. The Finnish adopt various reasons to justify their need for innovation policy aimed at services:

- The present innovation system does not adequately encourage services to innovate

[65]Largely based on Tanninen-Ahonen (2004 and 2006), Rautiainen (2005) and Suutari (2006).

- Yet the significance of services is constantly growing in the whole economy
- The development of innovative service concepts is a tool for strengthening and improving the performance and global competitiveness of service industries
- The systematic development of innovation processes has a positive impact on the productivity and quality of services
- Studies of service innovations bring to the fore neglected aspects of the innovation process, widely distributed throughout the economy

A research programme specifically oriented at enhancing services innovation seems to be a fairly rare initiative, and the Nordic countries seem to have made the running here. The Serve –Innovative services Technology program deals with services innovation and runs from 2006 to 2010. The objectives of Serve program are:

- Developing innovative service concepts that are: (1) easy to duplicate (2) utilize technology or other systematic methods and (3) can be competitive also in the global context
- Encouraging systematic service development in SMEs to (1) strengthen and diversify R&D activities in service related activities and (2) to improve productivity and quality of services
- Developing business models based on innovative service concepts

The objectives of the programme are to strengthen and diversify innovation activities in the service sector. This will encourage the creation and growth of innovative services/service concepts that can be competitive also in a global context and it will improve the productivity and quality of services. The implementation of the programme takes place at three separate levels:

- At strategic level: influences on the innovation policy
- At operational level: Technology programme services
- At project level: project funding process (projects) to activate projects of new clients (service companies, service-related research organisations and universities) and to promote and strengthen the internationalisation of service innovations

The Finnish agency, TEKES has undertaken initiatives focused on knowledge-intensive services (see Tanninen-Ahonen, 2004). The page dealing with “service sector” initiatives leads to some reviews of the roles of business services in Finland, and lists projects on:

- Business concepts for industries - UTT 2000—2004
- Competitive Reliability 1995-2000
- Control of Vibration and Sound - VÄRE 1999-2002
- Diagnostics 2000, 2000-2003
- Electronics for the information society - ETX 1997-2001
- Global Project Business 1998 - 2001
- Healthy Building 1998-2002
- Industrial Applications of Multimedia 1996-1999

- Information Technology and Electric Power Systems Technology Programme TESLA
- 1998-2002
- Quality in Business Networks 1998-2001
- Results of the Digital Media in Health Care technology programme
- Transport Chain Development Programme KETJU 1998-2002
- Water Services Technology programme 1997-2001

Finnish future activities in relation to service innovation include:

- The Innonet –SSA: Innovation Policy Project in Services. A preparatory action for a future InnoNet that will aim at joint European activities on services and innovation
- Service and Innovation Conference, October 10-11, 2006 in Helsinki. This will be a high-level conference that will bring together decision makers, experts and business practioners interested in developing the economic performance in services. The conference will highlight the importance of policies facilitating service innovations.

Norway

The Department for Manufacturing, ICT and Services of this Research Council has since 2002 run a programme entitled PULS,[66] which "supports research-based innovation" directed towards research challenges in "the service, commerce and logistics sectors". The website says that the program "focuses on value creation in service oriented enterprises through networking and collaboration". The main target groups are private companies, research institutions and their partners in public sector. The program offers financial support to research projects dealing with innovation processes within and between companies and development of knowledge based products and services, including efficient logistics and transportation solutions." PULS is receiving investment of approximately 24m US$, and continues until 2010; it follows on an earlier service research programme, TYIN which ran from 1996 to 2001 and involved approximately 43m US$. PULS (along with other parts of the Research Council's innovation programme) is intended to differ from other Council activities, with more input to industry players: research should have (horizontal) implications for decision makers in service industries and service-intensive companies rather than policy decision makers.[67]

Pederson (2004) describes some projects of PULS as including two "innovation instruments" (the first and last of the four below) and two "knowledge instruments" (these are the middle two bullet points)":

- **Logistics and transport services.** "Dynamic optimization of transport services", 2.5m US$; Develop algorithms, systems and services for dynamic transport planning (e.g. rush-hour traffic pattern servers)
- **Knowledge based/intensive services and flexible working forms.** "The knowledge workplace", 3.3m US$; Analyze experiences with flexible working forms in Norwegian companies (several "experiments" in Telenor, Statoil etc.); Convert analysis results into "new knowledge workplaces"
- **New services and business models.** "Mobile and Channel Integrating Electronic Commerce", 0.9m US$; Demand side - adoption and effects of using mobile data services; Supply side - business models for providing mobile data services

[66] See (in Norweigan) http://www.program.forskningsradet.no/puls/

[67] Correspondence with Per E Pedersen, 2005.

- **ICT-based services.** "Mobile therapy and self-regulation", 1.5m US$; Develop mobile services supporting compliance to medical treatment (smoking/drug/alcohol problem – psychological control, medication– treatment control)

It is apparent that these initiatives cover a broad range of services; and some are aimed at services' organisation and processes, and others at innovative (or improved) service products.

United States

While some of these are specifically aimed at service firms, many seem to be more generic. In the USA, the TASC (1998) study for NIST pointed to a range of technologies of relevance to many services that could also be the focus of R&D: electronic commerce technology, speech recognition technology, and set-top box technology (for digital TV, etc.). They pointed to the need to develop formal methods to identify such generic technologies (they also use the term "infratechnology") to support the service sector, in the same way that NIST traditionally supports manufacturing through participating in voluntary standards organisations, developing tools, databases, and reference materials, to support performance assessment and conformance testing.

This case seems to have had an impact on the US research scene, with the National Science Foundation opening a call for proposals in 2002 on research that would: "explore novel lines of basic research that promise to extend the range of focused empirical, analytical and computational techniques for design, planning and control of service products, operations and processes, and/or advance policy insights with relevance to practical solutions in service enterprises. These could include, but are not limited to modelling and representation of processes, data gathering and exploitation, methods and metrics for assessment, and decision tools for planning and control. Some issues will parallel those already dealt with successfully in manufacturing, and creative adaptations of corresponding tools and concepts may prove fruitful. Other lines of investigation will be unique to services or particular sectors. Analysis and computation with operations models will be at the heart of the research effort, but behavioural, economic, mathematical and statistical issues will be central to some topics. ….. Emphasis is on novel and high risk ideas with the potential for high payoff. Some topics appear worthy of special attention because of unique characteristics of service activities.

- The dynamic, demand-responsive nature of many services makes the modelling and decision making under uncertainty significantly more critical than in manufacturing settings where production is often pre-planned to exploit economies of scale in closed physical environments. Specific topics range from optimal resource allocation and scheduling in settings with high uncertainty and no service inventories, to price and revenue optimization across time and classes of customers, to instruments and markets for management of financial risk.
- Service network safety, security, reliability and control are central to many enterprises that must coordinate a variety of resources to fulfil customer needs ranging from the straight-forward to the highly complex, and confront periods of excess demand, crippled operations or safety risks leading to massive congestion and delays, and the prospect of perverse system interactions with calamitous consequences. Research is needed on techniques for avoiding, predicting, controlling, and recovering from serious capacity losses, market disruptions, demand overloads, and threats to security.
- Location, allocation and coordination of service operations at different facilities are also important issues, including the efficient matching of staff skills and training to handle

the spectrum of customer needs and decision mechanisms for win-win collaborations among providers with different objectives, as well as the management of large service endeavours such as construction projects.

- Process and product design and definition are difficult in many settings, particularly where the delivered service is customized for each sale (e.g., construction), initiated by a diagnosis phase before service delivery (e.g. equipment repair) or structured around the active participation of the customer (e.g., medical treatment). New insights and models are needed to find parsimonious descriptions of such processes and products that facilitate evaluation of alternative designs and planning for needed delivery support. In many cases this will require development and incorporation of behavioural models of customer decision making.
- The less standardized and subjective nature of services makes quality and reliability measurement and management critical issues. Metrics and models of quality and reliability must be derived that provide sound quantitative bases for product and operations design and control, taking into account as appropriate empirically based insights about customer preferences. Concepts of quality management at every stage of production, which have proved tremendously effective in manufacturing settings, may also be adaptable to improve both quality, safety and efficiency of service operations.
- Data from sensors and activity processing is pervasive in many service settings, but its effective use in improving quality and productivity requires focused new tools for data collection design, data management and data mining. Issues include modelling and suppression of widespread errors known to permeate operational data, placement and function of system state and health monitoring systems, and estimation of the values that are critical for design, planning and control through the fog of massive data sets and in the presence of dynamic change with improving information over time."68
- In addition to research and R&D programmes, there are other types of innovation policy intervention that may influence services' R&D. There may be efforts to establish innovation centres and service laboratories, along the lines of industrial RTOs. E-commerce is one area where there has been some movement toward establishing such facilities, though at present there seems to be something of a gap between more academic, computer-science based research groups, and more industry-based associations aimed at raising awareness, consolidating standards, and influencing government policies. In the UK, for instance, the Centre for Excellence in E-commerce pursues long-term research on IT, usability, and related topics

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

[68] Cited from http://www.nsf.gov/pubs/2002/nsf02029/nsf02029.html#DESC See also http://www.isye.gatech.edu/nsf_workshop/index.php for a conference discussing service engineering, that helped orient this programme.

6.2 Three basic approaches to services R&D and innovation

Many innovation scholars, policy analysts, statisticians and policy-makers have analysed, measured and reported on services R&D and innovation. In fact a multitude of definitions, studies and sometimes experiments (in terms of measurement and dedicated policies and policy schemes) are reported.

Nevertheless, we think that the many ideas and views on services R&D and innovation can be basically reduced to three basic approaches to services as identified Coombs and Miles (2000). They outlined, focusing on services innovation, two main lines of analysis represented in the literature, and suggested a third approach as being more fruitful.[69] These three basic approaches – leaving out the approach of complete ignorance as we presume this approach is no longer seriously supported -have been summarised in a nutshell in figure 6.1 and is introduced briefly below.

The **assimilation** approach mainly starts from the idea that R&D and innovation is still about technological R&D and technological innovation, that some services industries may play a role here and that existing policies mostly need to be made somewhat more accessible for those service firms that perform technological R&D and innovation (trend towards horizontalisation that is applying standing policies to more industries). There are indeed indications that technological R&D and innovation in service firms are underreported. There equally are indications that service firms with technological R&D and innovation are not always that well connected to standing R&D and innovation policies. Services can be included in existing R&D and innovation policies.

Figure 6.1:Three approaches to services R&D and innovation (den Hertog, 2006)

Theory / practice / policy Approaches to services	Theory of services R&D and innovation	Empirics & statistics on service R&D and innovation	Services R&D and innovation Policy
Assimilation Approach	Technological R&D and Innovation is the norm and services are simply less (technological) innovative. Look at the figures!	Technological R&D and Innovation is much lower in services, however variation between industries is large	No specific policy other than increasing service sensibility of existing generic R&D& I policies
Demarcation Approach	Innovation in services is unique and specific service innovation theories are needed. The peculiarities approach to services	Major part of innovation in services is non-technological. Service innovation is mostly not managed explicitly	Specific / vertical service R&D and innovation policies are lacking and much needed
Synthesis / systemic approach	Differentiating between manufacturing and services no longer works. Innovative service functions need to be part of wider innovation systems. A grand unified innovation theory is much needed	Service functions are ubiquitous (and intertwined) in services ánd manufacturing. They play a key role in creating innovative & differentiated products and services	Services need to be built in into systemic innovation policies paying attention to innovation policies and 'non-innovation policies'

[69]Miozzo and Miles (2003) found a similar contrast apparent in the literature on services internationalisation.

The **demarcation** approach is quite popular among services innovation researchers. They pointed at and reported about the peculiarities of services, the predominance of types of innovation other than pure technological innovation and the different innovation processes or innovation styles of services R&D and innovation. As services R&D and innovation are conceptualised as rather different from the 'regular and well known' technological R&D and innovation a plea is made for new ways of measuring it and development of specific policy initiatives suited to services R&D and innovation. This would mean a development towards more specific or vertical R&D and innovation policies. Although this might be needed in some industries, this would require a quite detailed understanding of individual industries by policy-makers. Further the increased intertwining of services and manufacturing industries, the rise of service innovations deriving from manufacturing industries and the fact that most innovations in both manufacturing and services are about combinations of technology and new services concepts and about how these are translated into sound business proposition makes the demarcation approach a form of overshoot which is probably not that productive.

The **synthesis** or systemic approach starts from the idea that technology and non-technological innovation, manufacturing and services innovation typically support and need each other. Every firm is made up of a (different) mixture of service and manufacturing like functions. Most innovative firms realise they also have to differentiate themselves from the competition by adding extra service functionality to both manufactured goods and services. Seen from a systemic or evolutionary innovation perspective two questions are extremely relevant:

1. Is the established innovation system (especially in terms of the wider institutional set up, built in incentives) designed and modelled well enough towards facilitating services R&D and innovation?
2. Does the sets of firms dealing with or playing a role in service innovations contribute well enough to the overall quality of the NIS i.e. innovativeness of services is a system characteristic that may help in improving the overall functioning of an innovation system (see for example the way in which KIBS may improve the functioning of client firms)?

Taking on this more systemic perspective would imply a broader perspective on services R&D and innovation and could for example result in proposals for all sorts of non-R&D and non-innovation policies that would benefit overall innovativeness and eventually competitiveness.

6.3 Does services R&D and innovation matter?

The question set out at the beginning was whether it made sense to look at services R&D. There is a received wisdom that services perform less technological R&D, and therefore they inevitably use and benefit less from existing (technologically oriented) R&D and innovation schemes. Service firms are simply not that much focused on technological innovation. Although this might be true for some service categories (as well as for some manufacturing industries as well) this picture is much too crude and in some cases definitely wrong. At least some services are technology-intensive, and some support innovation in all sectors. New ICTs allows for much innovation among users, it is often not passively absorbed. Further it can be questioned whether nontechnological R&D should be accorded its due significance, in any case. There are examples where non-technological R&D and innovation is driving innovation and in most cases it is still the combination of technological and nontechnological R&D (in whatever shape) and nontechnological R&D and innovation that make new commercially viable combinations.

Apart from theoretical arguments to be discussed later on there are in our view some practical reasons to at least (re-)consider R&D and innovation policies to become more services oriented. Some of the key results of the secondary analysis of existing statistics on the pure economic impact of services, their R&D performance and the support for innovation activities as performed within RENESER are highlighted in the table below.

Table 6.1: Some key statistical evidence suggesting why it make sense to look at services R&D and innovation policies

On the economic impact of services
Services dominate advanced economies such as the EU and US.
Services are the main growth sector of advanced economies.
productivity growth in services is important for total economic growth (but lags compared to manufacturing and is lower in EU compared to US)
Services are likely to be increasingly traded (and affect competitiveness more directly)
On R&D and innovation in services
Services' share of business expenditure on R&D is 15% in the EU and 39% in the US
R&D in services is growing rapidly in most EU countries (but faster in the US)
Most 'official R&D' in services is recorded in computer and related services, telecommunications and R&D services
Probably a considerable amount of services R&D taking place in hybrid firms is still allocated to manufacturing
Services are (when focussing on technological innovation) overall (slightly) less active in innovation than manufacturing firms, although variety in innovation intensities between sub-sectors is substantial
Although overall service firms are less likely to engage in R&D, but if they do formal R&D investments form a sizeable proportion of overall investments in innovation activities
Quite some R&D investments of service firms are not recorded as they take place outside R&D or innovation departments.
On financial support for innovation activities
Of the innovation active firms, service firms (compared to manufacturing firms) are less likely to receive support for their innovation activities
Amongst innovation active firms, large manufacturing firms are by far the most likely to gain financial support for their innovation activities.
Amongst innovation active services, business services are considerably more likely to receive support than are other services.
Amongst R&D active firms the proportion of firms receiving support for their innovation activities also varied widely between countries.
In most countries, national support innovation appears to favour manufacturing firms over service firms amongst those active in R&D, but there is less of an apparent manufacturing bias amongst firms benefiting from support from the EU.

The case studies performed within RENESER equally pointed at the considerable – but compared to pure manufacturing firms partly differently shaped - R&D and innovation efforts of service (and hybrid) firms and the way these activities were organized, budgeted and managed. Some stylised findings from the sample of 21 case studies are for example that:

1. Most service firms show some form of structured attention for services R&D and innovation, however services R&D&I is mostly less formalized, more distributed, less explicitly managed and funded.
2. A dedicated long-term services R&D and Innovation strategy (and hence management) at the level of the board of management is rare. Formalised methods for deriving at services R&D and innovation strategies are limited.
3. Quite a few service firm show quite high levels of technological R&D as well as technology enabled innovation next to process/service delivery and organizational innovation.
4. Formalised, pure services R&D and innovation is the exception rather than the rule. However, in practice important services R&D and innovation activities are hidden under labels such as business development, service improvement, new service development etc., without being recognised as services' R&D&I. A lot of services R&D is also hidden in client specific solutions.
5. In less than half of the cases more formal methods for managing services R&D and Innovation portfolio's were used and at the project level also less than half of the firms involved used more formalized (mostly rudimentary models) for service development
6. Although open models of innovation feature quite prominently in most cases, there is considerable room to improve R&D&I collaboration between service firms and HEI/RTOs as co-operation on services R&D and innovation is mostly poorly developed.
7. Most large service firms are not well connected to the R&D and innovation policy scene (unless they perform extensive tech R&D themselves)
8. Existing R&D schemes are of limited value to most service firms and most of them find it hard or unappealing to get access to or participate in them.
9. There is a whole array of innovation and non-innovation policies that could facilitate service firms to become more innovative and eventually more competitive
10. Increasing competitiveness and regulatory shifts are important drivers for services R&D and innovation
11. There is a huge potential for cross-firm and cross-industry (lateral) learning
12. Creating an innovation culture suited to services R&D and Innovation (in firms, in industries, society wide) is seen as key in successfully growing competitiveness through services R&D and innovation.

These results have been occasionally echoed in other studies, but the general absence of detailed analysis of services' R&D suggests there is still much to learn.

All in all the sheer size of services in the total economy, their potential in creating economic growth and welfare (through considerable opportunities for productivity gains[70] as well as their contribution to making manufacturing firms more competitive), the still small but rising share of services in business (technological) R&D expenditures makes that R&D and innovation policy-makers need to seriously reconsider whether they facilitate services R&D and innovation well enough using the current policy mixes. The relative weak links of most service industries with the science base, and the fact that there is a bias against service firms (even if these are technologically innovative) in terms of support for R&D and innovation makes this reconsideration even more relevant.

From the European political point of view, the objective of turning the European Union into the most competitive power in the world by 2010 does not seem to be feasible, at least by increasing the R&D expenses to the 3% of the GDP, as services are left out of the picture to a large extent. The need of competitiveness in EU services, given the global economy pressing, makes innovation becoming the key strategy to face the competitive challenge. A more competitive environment is also expected from the on-going achievement of the internal market for services. The new services directive and other actions towards the internal market for services will also increase competitive pressure in some service industries and most likely the need for services R&D and innovation. Finally, revamped R&D and innovation policies should not necessarily imply huge investments in additional budgets for R&D and innovation as various types of non-R&D and non-innovation polices might be used as well to trigger services R&D and innovation.

Now that we have discussed some practical and empirically based arguments for having services R&D and innovation policies we turn to more theoretically inspired debated whether market failures also apply services R&D or not.

6.4 Does the market failure argument apply to services R&D as well?

As noted above, there is a received wisdom that services perform less technological R&D, and therefore they inevitably use and benefit less from existing (technologically oriented) R&D and innovation schemes. Service firms are simply not that much focused on technological innovation. The implication is then that we need not pay any specific attention to R&D and innovation in services. We have already dealt with this argument.

A further argument is that innovation in services typically takes place quite close to the market, and so the case for intervention aimed at facilitating innovation is less obvious. Innovation in services is not sufficiently fundamental to be supported; there is a clear fear that government intervention might distort competition. A related point is that there are serious doubts whether externalities from investments in non-technological R&D and innovation are similar to externalities from investments in technological R&D and innovation. (Alternatively, services innovation involves so much organizationally specific development that there is little scope for spillovers across firms.) The classical argument for supporting private and collaborative (technological) R&D in firms is that through these externalities social returns to investments made in R&D are higher compared to private returns for the firms making these investments. The resulting underinvestment in

[70] E.g. the European Commission (2003) has pointed at the relatively low productivity and performance of many services sectors and O'Mahony and van Ark (2003) have pointed at the reduced use that many services are making of ICT in Europe. However, we would caution that productivity indicators for services are notoriously unreliable. Measurement of services output is very problematic: see e.g Eurostat (2001).

technological R&D and innovation is a market failure which may be corrected through supporting private R&D efforts. This is the type of argument on which for example national ministries of Finance accept some R&D schemes. However, these spillovers are strongly associated with technological R&D which is again mostly associated with manufacturing industries.

One can seriously question whether this narrative starts from the right assumptions (as is also noticed in a recent EU-communication - see box 6.2 below). In the first place – as we have observed in our sample of case studies – are service firms and service industries more active in technological R&D than sometimes anticipated. Especially in business related services there are quite a few cases in which services are performing substantial technological R&D. From the statistical analyses we learned that service industries such as computer services, telecommunications a d R&D and engineering services are more likely to engage in R&D than other service industries and indeed than most firms in manufacturing industries. Here the standard market failure argumentation is as valid to these firms and industries as it is in manufacturing firms and industries? Secondly, investing in technological R&D is just one of the ways through which firms are becoming more innovative (and eventually increase productivity or become more competitive). Some forms of innovation do require relatively more investments in non-technological innovations such as new organizational or marketing concepts, new client interfaces, new type of delivery organisations or new smart combinations of service and product elements. These investments are as real as investments made in technological R&D, although probably less well visible (therefore the name intangible investments!). However, as these investments made in intangibles lead to the sort of innovations that trigger economic growth there is no reasons to not facilitate these. However, the 'danger' for the individual entrepreneur of social benefits being higher than private benefits needs to be real (yes, there should be externalities involved), as well as the investments involved (yes, these softer type of innovations do come at a cost and require serious investments). A third argument to distrust the idea not to support non-technological R&D and innovations is that this is based on the idea that technological R&D and innovation and non-technological R&D and innovation can be treated separately. In today's reality it is increasingly difficult to see these two separately. Many innovations today are smart combinations of new or advanced technology in combination with new service elements or smart services enabled by innovative use of technology. At the level of firms and industries these artificial divisions can be observed as well by manufacturing firms developing into hybrid firms realising a considerable part of their turnover in service activities and service industries developing into firms with a sometimes impressive technological capability.

BOX 6.2:HOW THE COMMISSION REPORTS ON MARKET FAILURE IN RELATION TO SERVICES IN THE RECENT STATE AID FOR INNOVATION COMMUNICATION

"The sources of market failures which are relevant to innovation have been identified by the Commission as the following, on the basis notably of a review of case practice: innovation as a public good and externalities; inefficient dissemination of information; shortcomings in the capital markets; mismatches on the labour market and coordination problems. These market failures can possibly be tackled through State aid, by changing the incentives of the beneficiaries so that they engage more in innovation-related activities.

In addition, the Commission found that technological innovation represents only a part of the innovation potential. In particular for the services area, innovation also requires developing new business models, methods and tools. Innovation practices in the services sector tend to be different from those of other sectors. They tend to rely more on, for instance, professional knowledge and creativity and on organisational innovation. Many service companies are believed to invest substantially in innovation related activities, but this phenomenon remains largely unreported in national statistics, surveys and accounting statements. (p. 19).

See Consultation Document on state aid for innovation (COM 436 dd 21/09/2005, p. 19)

Do market failures inhibit new innovations in services R&D and innovation? What we need is a serious review of the market failure argumentation from a services or non-technological innovation point of view as well as empirical research to see if these alleged market failures can be found in practice. Van Dijk (2002) studied three different types of market failures in service innovations:

1. Externalities: When societal returns to innovations exceed the private returns firms may innovate too little, because innovations may 'leak' to competitors due to imitation or employees switching jobs. This is related to appropriability, but also to entry and exit conditions for firms and individuals.
2. Market power: This may be the result of high sunk costs, natural monopoly, low transparency or high switching costs. This is clearly related to industry concentration.
3. Asymmetric information: Risk adverse consumers will be reluctant to switch to new services, hampering their sales.

He concluded that the strong heterogeneity in services makes it difficult to generalize as to the prevalence of these market failures. He therefore developed an alternative, more functional typology of service industries,[71] to show the large variety in service innovation and to be able to better identify possible market failures. He further concluded that in each type of service industry a different mix of market failures– is likely According to van Dijk externalities are most visible in innovations in transport, post and telecommunications, financial services and some personal services. Market power can be observed in (again) post and telecommunications, banking and financial services and business and personal services. Asymmetrical innovation was found to be most prevalent in telecommunications, financial services and business services. He noticed that these market failure can be reduced through policies, but that may be harder as service innovation are difficult to define and in some cases the costs of these policies may be higher than the benefits.

[71] He differentiates between the following (overlapping) categories: intermediary services; capital-sharing services; network services; knowledge or skill-sharing services; trade and repair services; transport and storage; post and telecommunication; banking and insurances; staffing agencies; business services and personal services (see p. 7-10).

Rubalcaba (2006, forthcoming) has, in a somewhat different vein, also reviewed the applicability of the market failure argument to services innovation and linked this more directly to policy options. He makes a similar differentiation between: uncertainty and risk; externalities, scale economies; and market power. He more explicitly links this to possibilities for policy development. He states that in services, uncertainty is not only related to the investment risk, but also and particularly to the imperfect and asymmetric information. The latter can lead to distrust and less inclination to invest in (both innovation and consumption of) new services. Perceived risk and uncertainty of market players may justify public investment, some financing facilities or attempts to either boost demand for new services or increase transparency of markets. Externalities and the associated problems of free riding and problems regarding appropriability (which may be larger in services due to the limited use of patents and copyrights) might give rise to dedicated IPR policies or even direct government intervention (as long as this leads to maximization of net social welfare).

Rubalcaba further distinguishes scale economies as a separate category of market failures related to the indivisibility of technological activities requiring a minimum critical mass. The problem of indivisibilities in the world of services is probably less than in the case of goods, where R&D processes are better structured and require a higher quantity of inputs. As innovation processes are more diffused in production processes in the case of services, it seems to be easier to reach a critical mass. On the contrary, when innovation effort concerning inputs is put into qualified human capital some market failures may be present which can for example be dealt with policies in the field of education and training. Typically SMEs which are even more dominant in most service markets than in goods markets may also suffer from scale diseconomies reinforces the traditional justification of SME-oriented policies. Finally market power is mentioned as a fourth category of market failure that is relevant in a number of service markets. As quite a number of service firms are operating segmented markets with a high monopolistic power, this market failure may seriously limit competition and thus innovation. This market failure can give rise to competition policies aimed at service markets.

Whether or not the intervention argument for technological innovation also applies to non-technological innovations – i.e. market failure – depends according to van Ark et al (2003) on two questions:

1. “whether or not a (long and hence expensive) learning process precedes the non-technological innovation;
2. whether or not other firms can easily use or copy the non-technological innovation; in other words, are there knowledge spillovers?”

They argue that non-technological innovations may require extensive learning processes for individual firms (hence considerable investments) while future returns are uncertain. They indicate that non-technological innovations come about as a learning (by doing) process, and are not easily implemented and transferred. For example, a study by Kox (2002) showed that firms in the business service industry are quite often strongly dependent on inherent tacit skills of key employees in the firm. Such tacit skills take much time to acquire and cannot be easily transferred to other employees in the firm. As the lead-time to obtain the returns from investment in skills can be quite long and the future returns themselves are quite uncertain, firms may be supported to make such investments nevertheless.

Van Ark et al. (2003) indicate that they find it harder to assess whether knowledge spillovers are present regarding non-technological innovation. This depends for example on the type of non-technological innovations, whether these are internally focused or not and

how easy they can be observed from the outside. Put differently, how easy and at what costs can non-technological innovations be copied by other firms. Typically new marketing concepts are directly visible and can easily be copied. New organisational types of innovation also easily transfer between firms as employees move between firms, and when firms co-operate in networks or within the value chain. Van Ark et al (2003) also observe that : "…However, non-technological innovations are also strongly correlated to each other. Hence when one type of non-technological innovation is easily imitated, it implies changes in other innovations as well. Still imitating firms can perhaps find a way to implement such additional changes at lower costs than the originally innovation firm, although adaptation to the specific firm-culture may still be costly. In any case the original innovating firm may refrain from engaging in non-technological innovations when the social returns of these innovations are much higher than the private returns. On this basis non-technological innovations may become the subject of government intervention, e.g. by assisting in the adjustment of the organisational structures when private incentives are lacking."

If long and costly learning processes are, in practice, mostly combined with relative easy imitation (at least the costs of making the 'stolen innovation' work should be considerably lower as there is also the lead-time and possibly a reputation advantage of the innovator) it would most likely result in economy-wide underinvestment in service R&D and innovation. This would make it more logical to consider a R&D and innovation policy that more explicitly pays attention to services R&D and innovation.[72] At least we may conclude that - although more academic and policy research is needed on market failures in service industries - it cannot be taken for granted that market failure is perceived to exclusively apply to technological R&D and Innovation and not to non-technological R&D and innovation. The two are anyhow in practice more interlinked and hard to separate.

In the subsequent section we look for a possible third type of rationale for services R&D and innovation policies. It starts from the idea that innovation in service firms (rather service functions) suffer from an innovation environment or innovation system that is mostly not well suited to cater to the needs of service innovators.

6.5 Beyond market failure: systemic failures

In this section we look beyond market failure argumentation and look at another type of failures i.e. systemic failures. The sort or argumentation used here is mostly based on evolutionary rather than neoclassical approaches to innovation. If we take the notion of innovation systems as a point of departure and look how services R&D and innovation fits in two questions surface:

a. Are our innovation systems designed well enough to cater for the needs of service innovators and trigger innovation in services and service functions (how does the system impact upon the service firm)

b. How does services R&D and innovation contribute to the overall quality of the innovation system? Put differently how can services R&D and innovation contribute to the dynamics taking place in the overall innovation system (how does the service firm or functionality impact on the overall innovation system)

We will first deal with question A and use the typology of four types of systemic failures as mentioned by O'Doherty and Arnold (2003). For each of the four non-market type of

[72]See van Dijk (2002), Lipsey and Carlaw (2002) and Navarro (2003) for more on these issues.

failure[73] we tentatively provide a number of examples that illustrate that there is quite some room to improve the way in which we facilitate and support services, services R&D and innovation trough our innovation as well as through our 'non-innovation policies'.

The first category of systemic failure as identified by O'Doherty and Arnold (2003) is that of **capability failures**. They define these as inadequacies in potential innovators' ability to act in their own best interests. If we would translate this to the case of services (or rather service functions within innovation systems) we can think of:

- Service firms and their employees that might lack the right knowledge, skills, information and contacts to realise technological and non-technological innovations
- Service firms that are not capable of identifying the actual needs of their clients
- Service firms that are not capable to articulate their knowledge needs

Some of these capability failures are more or less generic and maybe not services specific, but some of these capability failures are services specific. The wider system should be designed in such a way as to reduce these typical capability failures.

A second category is that of **failures in institutions**. These are defined as "failure to (re)configure institutions so that they work effectively within the innovation system". This is probably one of the systemic failures that do apply most clearly to the services case. Applied to the services-case we can think of typical examples such as:

- schools that do not 'produce' enough future employees/employers students with the right set of capabilities for service firms
- innovation management courses that are biased towards manufacturing
- tax credit schemes that discriminate against service innovation
- statistics that do not record services and service innovations properly

We think that these examples illustrate how the institutional set up of an innovation system might lag considerable behind economic reality. Swift institutional adaptation can help considerably in laying the foundations for and facilitating much better services and hence services R&D and innovation.

The related category of **network failures** – that is failures related to the interactions among actors in the innovation system –similarly illustrate how the innovation system as a whole might not have adapted enough to the increased role played by service firms in general and their (potential) role in R&D and innovation. Typical examples refer to problems such as:

- a public knowledge infrastructure that primarily caters for the needs of manufacturing firms. How come that in quite a few innovation systems the creation of new intermediary centres of excellence that are seldom about 'service technologies'?
- government purchasing policies that do not challenge service firms (innovation is quite often not rewarded)
- An appropriate system for knowledge management and structural capital could be highly useful to cope with the non-technological innovations so network infrastructures such as technological centres, scientific parks and other business services centres may continue to a large extent to deal with this type of network failures.

[73]O'Doherty and Arnold mention five systemic failures and include market failure here as just one of the five types of they discern.

- an industry-science relations (ISR)debate debate that is strongly biased towards high tech industries, but pays hardly attention to the role of ISRs between the science base and services.

Finally **framework failures** relate to the fact that effective innovation depends partly upon regulatory frameworks, health and safety rules, etc., as well as other background conditions, such as the sophistication of consumer demand, wider culture and social values. Under this label typically a number failures are hidden that are real for quite a few innovative service firms and industries such as:

- all sorts of regulation that do not provide the right incentives for innovation in services (trade policies, spatial planning, environmental regulation, market regulation etc.)
- consumers that are not prepared to pay for innovative services
- foresight & road mapping exercises that are aimed almost exclusively at high tech and manufacturing industries
- governments that are not investing (enough) in innovative public services (which can act as 'role models')
- mobility schemes that focus mostly on scientists and engineers
- innovation debates dominated by technological innovation
- a lacking services' innovation culture

This last category ultimately well illustrates that there may be many failures that discriminate against services and services R&D and innovation. At the same time it shows that there are numerous ways in which the context in which innovative service firms have to operate can be improved through various lines of policies ranging from typical R&D and innovation to educational, competition, government procurement and various other lines of policy-making that are not primarily aimed at R&D and innovation.

Most innovation systems (or at least how typically most innovation analysts and policy-makers are thinking about its design and functioning) lag behind in adapting to an economy that for a considerable part is service driven. However, taking the innovation thinking in mind provides us at the same time with an analytical tool and somewhat broader set of policy tools to make the innovation system as a whole better suited to support services R&D and innovation. Especially some of the 'non-innovation policies' are identified as quite important to provide the right framework for services R&D and innovation to take place.

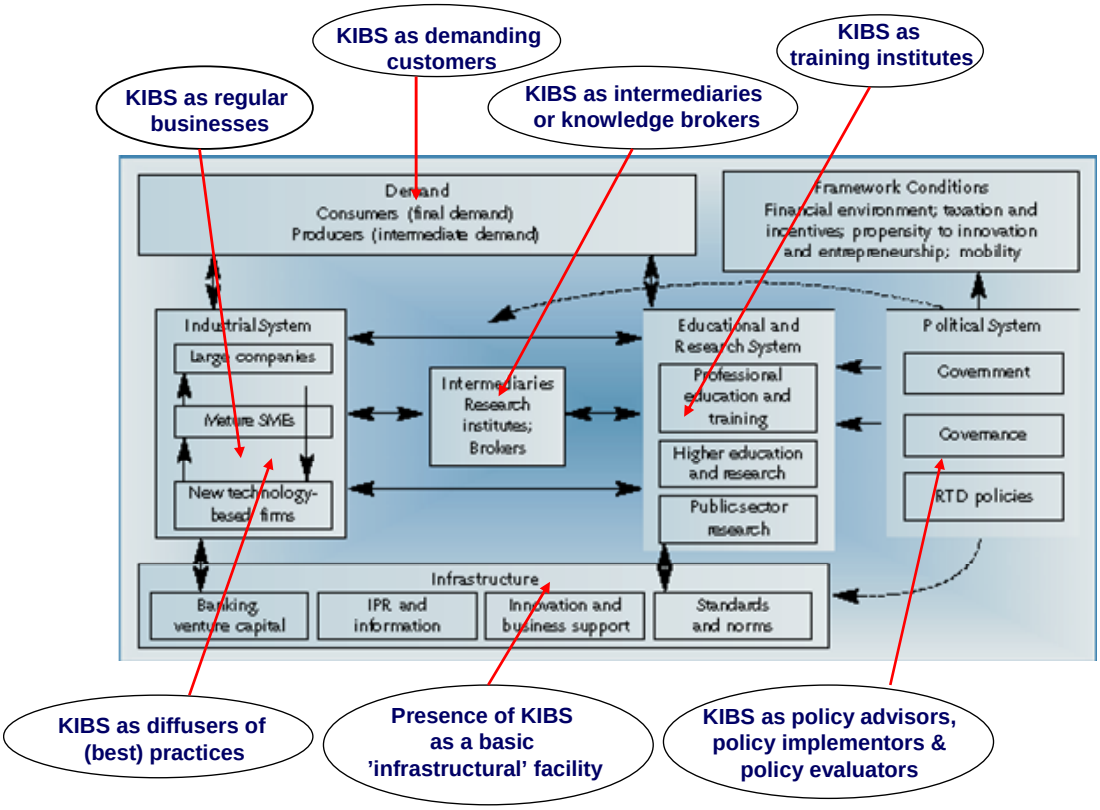
There typically is a tendency to mainly look at how service firms benefit or not from a particular NIS. There also is the issue how innovative services both in manufacturing and services sections can improve the dynamics of overall NIS. We think that especially business related services – and probably most importantly knowledge intensive business services - can play multiple roles in making innovation systems more dynamic and perform better. By way of illustration we have indicated in Figure 7.1 below a number of roles that KIBS – apart from being a dynamic business category - may play in innovation systems such as:

- diffusers of knowledge and best practices towards other (client) firms
- demanding customers (especially towards other KIBS) - most KIBS are quite used to buy in knowledge that is lacking
- knowledge brokers - KIBS are mostly well networked and therefore can bring different parties together in networks acting as intermediary.

- training institutes - typically young highly trained professionals enter at a rather young age KIBS firms, work there for a couple of years visiting many client firms, before spreading out to 'regular businesses'. The way that large consultancy firms or ICT service providers work is exemplary, but this training function can be found in many other KIBS as well.
- Advisory role towards policy-makers and even a role in some case in implementing governmental policies and schemes.

Increasingly KIBS are seen as being part and parcel of a fine entrepreneurial or innovation climate, as a basic element that you need for developing wide and deep clusters and networks. In almost all competitive clusters and networks you will find highly specialised service firms that help other firms to become more innovative and competitive. Therefore, adopting a systemic perspective when looking at services R&D and innovation does in our view not only understand how the innovation impacts upon the service firm, but also understand how a well built in service sector or 'service functionality' in the innovation system can increase the overall performance of this innovation system considerably.

Figure 6.2: The various role that KIBS may play in innovation systems (NIS-picture based on Technopolis (2000) and adapted by Smits and Kuhlman, 2004) (den Hertog, 2006)



In the next section we will present three stylised approach to services R&D and innovation, linked to the three basic approaches to services and services R&D and innovation as introduced in section 2 (assimilation, demarcation and synthesis/systemic approach).

6.6 Policy approaches to services R&D and innovation policies

In section 6.2 we introduced three basic approaches to services that can be applied to services R&D and innovation policies as well i.e.: assimilation, demarcation and synthesis or systemic approach.[74] Applied to policy-making the **assimilation** approach would not imply a specific services R&D and innovation policy other than increasing service sensibility of existing generic R&D& I policies. Current R&D and innovation schemes should cover services industries as much as possible as there are no theoretical or practical reasons justifying the exclusion of services. Some horizontal measures that take the services role more into consideration are required. In fact this approach could be seen as the no regret scenario.

The d**emarcation** approach starts from the idea that services have specific characteristics and needs which would require services specific R&D and innovation policies. Heterogeneity of the service sector at large and the fact that not all services have the same problems or the same behaviours, would lead to the need of specific measures in particular markets. In this perspective a horizontal policy is not enough to fulfil the interests of such uneven sectors including telecommunications, tourism, commerce or professional services. For instance, if there are whole sectors excluded from current R&D programmes, the consequences of such a situation must be analysed together with more appropriate methods of promoting R&D in those specific sectors and this may be specific, vertical policy initiatives.

In the **synthesis** or systemic approach services are perceived as a systemic dimension of economic activity and thus a potential focus of innovation practically anywhere. Existing and new policies should deal with the service dimension in any sector.[75] It also includes two specific objectives. Firstly, the inclusion of intangible elements as objects of R&D and innovation policies implies the acknowledgement that there are organizational aspects in the production of all businesses and that intangibles have a decisive role on innovation and growth. Secondly, its objective is not only to promote organizational improvements in the goods companies or R&D and innovation in service industries and firms, but also to improve the relationships between goods and services producing industries and firms. Policy initiatives starting from this perspective are have passed the services/manufacturing distinction, take a broad approach to innovation and see both R&D and innovation as well as 'non-innovation' policies as way of supporting R&D and innovation. Services R&D and innovation is understood as an horizontal element affecting the whole production system, and the lack of services R&D and innovation, as a failure of the system. Services are not only understood as an economic sector, but also as a horizontal dimension of the overall innovation system that may boost overall innovation and competitiveness. In some case these two roles are hard to separate. This has especially been noted for the role of KIBS. Marja Toivonen (2004, p. 103) pointed out this double role of KIBS, noting that: "The significance of KIBS in innovation systems stems from their numerous and versatile contacts with different stakeholders. On this basis it has been suggested that KIBS act as orchestrators of innovations and even orchestrators of whole innovation networks. They

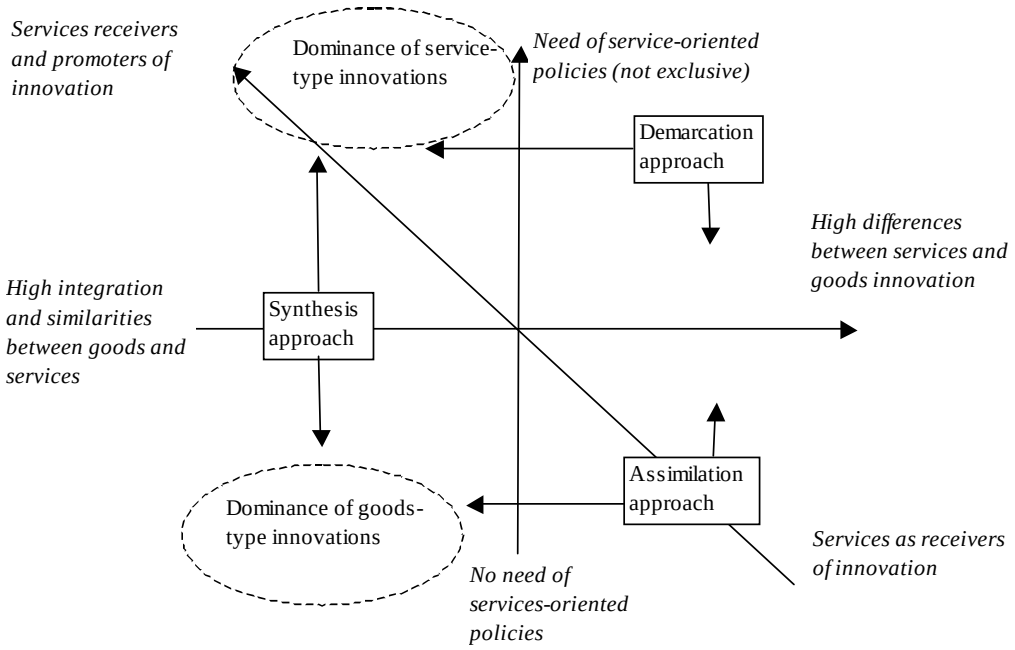
[74]The description of the three approaches given here is largely based on Rubalcaba (2006).

[75]It is worth highlighting that within the synthesis approaches, complementarity between the most frequent services-type innovations (e.g. organizational) and the most frequent goods-type innovations (e.g. technological change) would be possible. There are some evidences regarding the complementarity between services innovation and new technologies (Licht and Moch, 1999, Rubalcaba and Gago, 2006), although sometimes these have been given a less important role in it or the ICT is neither considered to be necessary nor sufficient condition for innovation (den Hertog et al., 2003).

are considered to form a node in a system of customers, co-operation partners, public institutions and R&D establishments and to constitute a part of the knowledge and innovation infrastructure of society, together with education and research institutions. Also empirical studies have confirmed the central role that networks and co-operations play in the activities of KIBS. Detailed analyses about the nature of brokering functions of KIBS are, however, only starting."

Figure 6.3 compares the three approaches around three dimensions: the role of services as receivers or promoters of innovation, the emphasis on similarities or differences between goods and services and the need of policies to service-oriented innovation. The approaches are where the main positions are placed, although there are some deviations towards one direction or the other. Services innovation is thus given more prominence, not only from the demarcation position, but also from the synthesis approach, since both of them emphasise services innovation within the whole economic system (including within manufacturing industry). This can be stated without the need to defend a specific services-oriented (or services sector-oriented) policy. In a way synthesis approach combines some specific (vertical) policies with generic (horizontal) policies.

Figure 6.3 Policy approaches towards services innovation (Source: Rubalcaba, 2006)



Let us give an overview of some policy options which would typically belong to each of the three approaches. (Table 6.2)

Apart from differentiating between R&D and already wider innovation policies also 'non-innovation' policies are included.[76] Especially some when adopting the systemic or synthesis approach the key issue is to make the system as a whole function properly and

[76] The importance of other policy areas for innovation, and the need to develop more integrated policies, is argued at length in Lengrand et al. (2003)

this not seldom require policy intervention or incentives from outside the traditional R&D and innovation realm. The three approaches might suggest that typically policy-makers would have to make a choice whereas typically some elements from assimilation approach can be started from (no-regret policies) while picking elements of the other two approaches. The history of neglect of some services industries might give rise to some selected policies to be taken from the demarcation perspective, whereas a switch to more systemic policies is a wider switch that applies as much to manufacturing as service activities. The key thing is eventually that these two are hard to separate and should be treated as if these are intrinsically related. There is not one answer as for every individual innovation system a (temporary) mix of instruments and policies will have to be developed that suits that particular innovation system. This is also dependent on economic structure, history, institutional set up, including willingness to experiment and invest in policy learning.

The research carried out by Miles et al. (2006) points out that thus far policies have had a less relevant effect on services than expected. This is partly explained by an inferior development of networks between policy-makers, public research institutions and private companies. That is to say, services are not included enough in the innovation systems of manufacturing, demonstrating that policies should be aimed at promoting the integration of services in the innovation system. This could be complemented with actions that make public innovation and R&D programmes more services-friendly, so that neutrality is reinforced and cannot be used as an excuse to discriminate negatively. And finally, some experiences of recent specific programmes for services such as those developed in Germany, Norway, Finland and the United States must be reviewed so as to learn from the corresponding examples.

The European Commission and the OECD – in addition to some individual lead countries - have only relatively recently embarked on services R&D and innovation policy and have recently started to include services innovation in its initiative programmes and guidelines, mainly from a horizontal point of view.

The OECD has summarized in recent documents (OECD 2005a; OECD 2005b as well as Pilat, 2001) its policies regarding the horizontal promotion of services innovation, as confirmed by the majority of the included countries. In fact the OECD declared itself in favour of a generic – non-specific – policy for services. The cited documents also acknowledges the lower use of public funds by services companies and the need to learn from best practices in specific services programmes launched by governments of countries such as Finland, Norway, Sweden or Ireland. The policies identified by the OECD are the following: development of business environment related to ICT, development of software industries, development of human resources, clustering and networking, R&D investment, reinforcement of services SMEs and start-ups, standards and intellectual property rights.

In 1998, the European Commission (European Commission, 1998) established the need to develop an innovation policy that considers business services needs. This idea was extended and developed in the 2003 Communication on business-related services; one of its paragraphs reads exactly as follows: “Services companies show a high level of innovation, and are often the leading edge users of advanced technological developments. Furthermore, knowledge service activities (e.g., management consultancy, computer services, R&D services) act as catalysers of innovation processes in the entire economy. Some of Europe’s most innovative companies are to be found in the services sector, but the overall level of R&D in this sector is generally low. The level of R&D in services lags substantially behind the US. Policy innovation initiatives should promote both specific actions oriented towards services activities (e.g., role of organisational service innovation), and more active participation of services companies in R&D programmes. The involvement

of services companies in the national and European R&D Programmes should be improved to address their specific problems and needs. The EU target of devoting 3 % of GDP to research and development will be less difficult to achieve, if the business-related services sector plays a larger role, reflecting their overall economic weight"

This text exposed the need of specific approaches for services, although the goods-services interdependence is strongly recognised. More recently the European Commission announced a strategy to promote innovative services in the EU in a recent communication[77]. In the latter it was stated that "the service sector plays an important role in growth and new jobs. At present, innovation in services is mainly driven by new offerings that respond to customer demand. But increasingly services are also driven by higher research investment and depend on the adoption of new technology. Recognising their increased importance for the European economy, by the end of 2006 the Commission will define a strategy to promote innovative services in the EU, based on the work and policy recommendations of the European Forum on business-related services[78]. Innovation support mechanisms will be geared to the specific needs of services and specific efforts will be made to measure service-based innovations better."

[77] See European Commission (2005).

[78] http://europa.eu.int/comm/internal_market/services/brs/forum_en.htm [footnote in quoted text]

Table 6.2: : Examples of assimilation, demarcation and systemic (synthesis) policies aimed at facilitating services R&D and innovation

	Assimilation policies	**Demarcation policies**	**Systemic policies**
R&D policies	• Increase accessibility of existing R&D support schemes • Inclusion of services in technological foresight & road mapping exercises • Include services firms in policies aimed at improving industry sciences relation-ships	• Support public R&D in services • Introduce vertical R&D programmes aimed at service industries (logistics, trade, etc.) • Services IPR instruments • Create dedicated CoE in services R&D at RTOs and HEIs • Increase role of the humanities in service innovation	• Understand and support role of R&D services (KIBS) in innovation systems • Support for services R&D in and through hybrid firms • Integrated R&D programmes paying attention to technological and non-technological R&D and innovation
Innovation policies	• Increase accessibility of existing Innovation support schemes • Innovation management training & practices more geared towards supporting all types of innovation in all industries • Mobility schemes no longer limited to QSEs	• Introduce courses on services innovation management • Awareness campaign on the importance of services innovation • Identify service innovation role models (including innovation in public sectors)	• Innovation & business support sys-tems also supports services innov. • Availability and use of specialized services / KIBS • Increase transparency in KIBS markets • Insight into & international competitiveness of key service functions • Cluster and network type of policies that deliberately include services • Government procurement policies • Support role of users in innovation
Non-innovation policies	• Increase coverage of services in regular and R&D and innovation statistics	• Use deliberately policies such as trade, competition education & training policies for fostering R&D and innovation in services • Regulations that might trigger services innovations • Analyse offshoring in services	• Use regulation & standardization to support innovation • Financial and credit systems that acknowledges intangible assets • Enhance high level service capabili-ties e.g. through education & training policies • Policies aimed at increasing entrepreneurship

One further element can be added to the discussion before we conclude. We can think of policy actions – whether involve training, awareness, financing, or whatever precise instruments – as falling into a number of types. Current policy approaches favour only a few of these types, and the need is to broaden the span of activity. Just consider the following:

- Promotion of more, and more effective, technological R&D.
- Promotion of better use of technological R&D in user organisations and those where spill-overs are possible.
- Promotion of more, and more effective, non-technological R&D, and of R&D involving both non-technological and technological elements.
- Promotion of better use of non-technological and "combined" R&D in user organisations and those where spill-overs are possible.
- Whether technological or non-technological, promotion of R&D organised in "non-standard" forms such as are common in service firms and departments (e.g. part-time R&D performed by professionals with other job titles and/or not managed by and R&D manger)
- Promotion of innovative activities in general whether or not they have narrowly-defined R&D as a central feature: extending the scope of the R&D concept, or applying acceptable and effective concepts of innovative activity and expenditure.

Evidently, the current debate about the need of a specific policy for services - or the revision of R&D and innovation policies to take better account of services - has just started in the last few years. More research is required to test and evaluate the impact assessment of different proposals and approaches. In this sense, this chapter still represents only a preliminary approach to the subject. In our view especially the systemic approach to services innovation is most promising, but this needs to be developed much further in the specific context of R&D measurement and management.

7 Services R&D research, statistical and policy implications

7.1 Introduction

This chapter begins with ten key messages that stem from the study presented in earlier chapters. Building on these, we then present a set of specific policy implications (section 7.2) and move on to outline implications of our studies for service research and statistics (section 7.3).

a. Services and Business-Related Services are extremely varied; this implies that they should not be treated as a homogeneous category of businesses

This a fundamental point with which we have to begin. While the study has raised numerous issues that are important for policy and future research on services and R&D, for practically every generalisation we make, there will be many exceptions. This reflects the immense diversity of services in general, as well as the diversity that exists more specifically within Business-Related Services; this point that will need to be taken into account in practically all follow-up action. “One size fits all” will not do. Moving to such an approach would be as unhelpful as allowing a manufacturing-dominated frame of reference to persist.

Action and research alike will have to be sensitive to differences across (business-related) services sectors and firm types, and be prepared to take these into account in designing and implementing interventions and measurement instruments. That being said, the following nine points will highlight some overall conclusions that are widely applicable and influence a wide swathe of activities. These conclusions – unless stated otherwise and taking on board the considerable variety among service industries – apply to Business-Related Services, and often to services more generally.

b. There is typically relatively poor integration of (most) services into R&D and innovation systems. Most service firms are poorly linked to the science base and innovation and R&D programmes. This partly results from (often implicit) manufacturing bias in existing R&D and innovation policies. Formulation of such policies typically fails to reflect the role of services in R&D and innovation systems.

”Open” models of innovation feature quite prominently in most cases examined in our research. But there is considerable room to improve R&D collaboration between service firms and research organisations, not least in business-related service industries. Cooperation in services’ R&D is, mostly, poorly developed.

There are good reasons to think that the low involvement of many services in most countries’ innovation and R&D programmes, and the similarly low use most services make of R&D generated by the “science base” of Universities and government laboratories, is not just a matter of services’ disinterest in such activities. There may be some truth in this, but other factors cannot be neglected. On the one hand, the organisation of programmes and the science base has typically been structured with manufacturing-based ideas of innovation and R&D in mind, even if this is only implicit. On the other hand, services are

typically prone to be much less well-embedded in innovation networks. Additionally, they lack capabilities to identify those potentially relevant R&D activities being conducted or proposed elsewhere. Broadly, research needs of business-related services are not well met, and the reasons for this relate to (a) service firms that do not articulate their needs properly, and (b) R&D and innovation infrastructures that are not well geared towards service R&D. The latter can be seen as a fault in the particular innovation process at hand, or as part of a more systemic failure.

c. There is room for boosting R&D in Business-Related Services in the context of the Lisbon strategy. Services do perform classic R&D and use classic R&D performed by others, but across the board services are still poor performers of classical R&D

Services do sometimes perform classic (i.e. technological) R&D and use R&D performed by other sectors. Some service firms and sectors are R&D-intensive, in fact. Though there are problems with the statistics, it does seem clear that classic R&D in services is growing rapidly in most countries (albeit from a small base).

The propensity to engage in R&D varies widely between individual service sectors. Services with high levels of technological opportunity, such as computer services, telecommunications, and R&D and engineering services are significantly more likely to engage in R&D than other services. Transport and distribution services (including retail) have a low propensity to engage in R&D. The vast majority of officially recorded R&D undertaken by service sector firms is undertaken by firms in three sub-sectors: computer and related services, telecommunications, and R&D services. The technology intensity in services in general and in Business-Related Services in particular is on the rise and might lead to more technological R&D eventually, but at the same time this effect is obscured by increased outsourcing of R&D, growth of technology-related services (a change in economic structure) and improved statistical coverage. The net effect is therefore hard to assess still. Nevertheless, firms in most services sectors are still relatively poor performers of “classic” R&D than comparable firms in manufacturing. Or put differently: there is scope for many services to increase their engagement with “classic” R&D, both as producers and users of the activity. Given the sheer size of the service industries, and the ambitious Barcelona target, service-related R&D conducted both within firms and across ‘systems of innovation’ will be crucial for meeting the Lisbon goal and enhance competitiveness of Europe.

d. Service R&D is still widely underestimated

Service R&D tends to be underestimated, even if we focus on classic R&D. This underestimation is in the first place due to the “non-standard” management of innovation in most services, However, in practice important services’ R&D activities are hidden behind labels such as business development, service improvement, etc., without being recognised as services’ R&D. The observed underestimation is also the result of a *de facto* exclusion of social science research from in R&D survey instruments.

But if we cast our nets somewhat wider, and also include some non-classical forms of R&D, the underestimation looks more serious. Many services engage in R&D-like activities that fall outside of, or at the boundary of, the classic understandings of R&D, due to the difficulty of differentiating these activities from customisation, design, and similar activities. The non-reproduction of many service innovations produced ”on the job” or client-specific solutions is a related problem, for service innovation management as well as for policy and measurement. These issues can only be dealt with if a wider, more services friendly, concept is adopted. Finally, service R&D in manufacturing firms seems to be a forgotten services R&D category. This omission can only be dealt with if services activities,

rather than (or as well as) service industries, are taken as a point of departure when analysing (service) R&D.

e. Formalisation of services R&D in vanguard firms and industries is on the rise

Increasingly, vanguard service firms show some form of structured attention to services' R&D and – even more so – to service innovation activities. Although formalized service R&D strategies, budgets and processes are still lacking in most cases, there is a trend in quite a few of the larger business related service firms analysed in this study towards some formalisation of planning, management and resourcing of services R&D&I. The growing role of service engineering and the recent initiatives to constitute a Service Science are examples of pro-formalisation trends. However, formalised, service-only R&D is the exception rather than the rule. We do observe in some large and innovation-intensive firms (especially those where R&D is embedded and formalised), that the simple distinction between R&D relating to goods, technologies and services is already felt to be obsolete. We note that there is little by way of research, literature, and management training on these topics..

f. Measurement problems are persistent and obscure the contribution of services to innovation, productivity and economic growth

The major issues regarding the measurement of services' R&D (in addition to the wider issue of measuring organisational and other softer forms of R&D) are intrinsically related to the services low-tech heritage, the "invisibility" resulting from lower levels of formalisation of R&D in services (less dedicated R&D specialists, less formal R&D departments, less formal R&D management, quite often for good reasons!) and the ignorance of social research-based R&D. Similar measurement problems are prevalent when assessing productivity and quality improvement issues in services. It is therefore almost impossible to assess with any degree of accuracy how service R&D contributes to productivity and eventually economic growth. There are no quick "fixes" to this problem.

g. Apart from some Business-Related Services, innovation active service firms are less likely to receive public innovation support than are their manufacturing counterparts

The proportion of innovation-active service firms that receive financial and other support for their innovation activities varies widely across Europe. But for services at large there is evidence (from CIS III data for a selection of EU countries) that they receive less support than innovation-active manufacturing firms.

There is also considerable spread among service industries . Amongst innovation-active services, business services are, in most of the EU countries analysed, substantially more likely to receive support than are other services. Fairly few transport and communication and financial intermediation service firms received support with their innovation activities, in contrast.

h. Furthering R&D and innovation in (business-related) services requires a systemic perspective!

Developing policies to facilitate R&D and innovation in services in general, and Business-Related Services in particular, requires a systemic approach. This involves posing two central questions:

- How do the relevant innovation systems[79] impact upon the service firm? How can our innovation systems be better oriented and structured so as to cater for the needs of service innovators and trigger innovation in services and service functions?
- How do service firms or functions impact on the overall innovation systems? How and how far do services R&D and innovation contribute to the overall quality of these systems, and how can this contribution be enhanced?

These two questions indicate that a whole array of R&D, innovation and non-innovation policies could on the one hand potentially help service firms become more innovative (and eventually more competitive), and on the other hand assist in the upgrading of innovation systems in such a way as to benefit from dynamic, innovative and competitive services. Service R&D and innovation policies therefore will eventually be a mix of R&D&I and non R&D&I policies geared to the particular needs of both the innovation system and set of service industries at hand. Adopting a systemic policy approach in relation to service R&D and innovation implies steering on the system performance, making sure that various actors and institutions in the overall innovation system are well aware of the importance and role of services, making sure the various actors that can potentially play a role in furthering service R&D and innovation are well connected and adapt to the needs of a service economy. This also means using a larger variety of innovation indicators and development of systemic policy instruments that take into account the characteristics and needs of services and service functions. Eventually systemic service policies also imply adopt different appropriate mixes of policy roles to further service R&D and innovation ranging from financier, supporter, broker, legislator and regulator, supporter to purchaser and so on and so forth.

i. Adopting a systemic perspective also implies going beyond the market failure argumentation that is common to legitimate policy efforts

The sheer importance of (business-related) services in terms of employment and value added is a practical argument for facilitating services R&D and innovation. The importance of these services for the rest of the economy strengthens this argument. This inevitably leads up to a more fundamental discussion whether market failures (such as externalities, information asymmetry, scale economies, market power) apply to services as well. Indeed, the strong heterogeneity of services makes it difficult to generalize about the prevalence of these market failures. However, as long as there are long and costly learning processes in combination with relative easy imitation it is likely that there will be economy-wide underinvestment in service R&D and innovation. This provides grounds for considering a R&D and innovation policy that more explicitly pays attention to services sectors and functions. Although the applicability of market failure arguments to services R&D and innovation requires a more thorough analysis, adopting a systemic perspective also implies moving beyond market failures and look at various types of systemic failures. The study concluded that there clearly is room to improve the way in which we facilitate and support services, services R&D and innovation as part of wider innovation systems. As well as directly involving R&D and innovation policies, this also requires examining and designing policies with other nominal objectives (e.g. education and training, environment, intellectual property, public services and procurement, and many other areas).

[79]These may be national, regional, technological systems, for example.

j. A more pro-services R&D and innovation culture is essential

Europe is still suffering from an underdeveloped services R&D and innovation culture and a lack of pro-services R&D and innovation culture in policy makers, not least as the majority of R&D-performing service firms are not that well connected to the R&D and innovation policy scene. Creating an innovation culture that is more suited to services' R&D and innovation (in firms, in industries, and society-wide) is the key to successfully growing competitiveness through services' R&D and innovation. Europe's underdevelopment in this respect is shared by the rest of the world, and we note that there are efforts to intervene in the situation now underway in locations such as China.

On the basis of these considerations, and the empirical material discussed in the preceding chapters, let us set out some major implications.[80]

7.2 Policy implications

The ten points above certainly justify the need for policy actions and provide specific criteria for action.

Why policy action? The report has shown that R&D and innovation policy actions can be aimed quite sensibly at boosting service innovation. A large number of market failures and systemic failures have been analysed, thus justifying policy action. Moreover, the existing programmes for specific sectors or activities contrast with the generally low level of direct support given to many BR services activities so far. The latter have been ignored too long, or existing programmes which are useful for services, have been predominantly limited to those related to ICT and the information society only.

What for? Since services represent the largest part of the EU economies and innovation is a key long-term growth factor, an improvement in services innovation has major effects. This is particularly true in a context where the role of services in advanced economies is often discussed as part of the wider issue of service productivity and services productivity growth: a service sector with slow productivity growth can lead to lower paths of economic growth and social welfare. Increasing services innovation in this perspective mainly serves to raise productivity. Nevertheless, beyond the services productivity debate (there are many statistical and analytical problems when measuring productivity in services), there is very little discussion about the positive contribution of services innovation to economic growth. The reason for this is possibly because how this happens is generally hard to trace statistically. Policy attention should therefore be devoted to a better understanding of the links between services innovation and services productivity and between services innovation and economic growth.

What to do?

1) Increase awareness among policy-makers and stakeholders

This entails the need to promote a pro-service innovation culture at different levels: enterprises, innovation managers, researchers, workers and policy-makers. Policy-makers and programme managers must be sensitive to the specificities of (different) services, and develop a better understanding of how innovation is organised in specific types of service firms and what their R&D needs might be.

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[80] These are largely generic implications. It is important to develop detailed implications for different types of services – perhaps particularly for smaller firms and those in "low-tech" sectors. But this is a task for further elaboration.

To do this calls for leadership and the Commission could play a major role in this respect. In other fields, the Commission has been quite successful in launching public and policy debates by establishing high-level expert groups, forums, workshops, studies, or other activities. The way in which an awareness strategy could be defined might integrate several specific actions. One particular action that could be explored in this context is the one proposed by the Commission Forum on Business-Related Services: the creation of a coordinating platform for the development and dissemination of information and ideas associated with research and innovation in services. This platform could become a sort of observatory and at the same time a centre for exchanging information among researchers, policy-makers and stakeholders in order to launch debates, studies, statistics, and awareness campaigns.

An active role of stakeholders (enterprises, professional associations, public bodies, researchers, etc.) is particularly needed. The lack of representation of many Business-Related Services firms at EU level should be pointed out, although efforts have been made over the last few years to involve very fragmented sectors in some cases, such as in business services.

The actions proposed here should eventually result in the design and implementation of interventions aimed at making the science base more responsive to the R&D needs of services. Many policy questions deserve more attention and debate. For instance: are there any requirements for the scientific infrastructure and support activities of particular significance for services? Are there any potential applications of emerging technologies that would benefit from the input of knowledge from service providers at an early stage? These and similar questions could have a place in the foreseen debate, exchange of information and eventually policy decision making. A basic objective of such an awareness strategy would be to define an innovation policy for services, since EU innovation policy remains dominated by technology issues. Although formulating such policies is primarily a political responsibility, and the actual formulation needs to be done by the Commission, a high-level working group would be beneficial here. Another key issue is the sectoral scope of the action. The heterogeneity of services requires a sector-by-sector approach in many cases. This would for example imply that working groups or specific actions could eventually be proposed to assess the role of R&D and innovation in distributive trades, financial services, transport and business services. However, some horizontal service themes are also relevant for any service or manufacturing sector. Therefore, a fine balance between the vertical and the horizontal dimension is needed.

2) Promotion of studies, debate, research and statistics

A major part of the awareness strategy could be linked to the promotion of research and statistics. This would result, for example, in a better informed debate, better and more solid arguments for policy decision-making. Much has to be done, for example, in the development and refinement of the concepts and measurement methodologies concerning non-technological innovation and organisational change. Section 7.3 will deal with specific suggestions in this area. At this point, it should be noted that these methodological issues are likely to be taken up most productively in the context of substantive policy design issues (such as ex ante and ex post evaluations of innovation programmes and impact assessment for new policy initiatives).

3) Assessment of the sectoral balance of R&D programmes and innovation policies

A major issue policy makers have to deal with is the trade-off between promoting sectoral or specific thematic priorities following certain horizontal-related criteria (for example, the promotion of ICT in enterprises, regardless of the economic sector they belong to, may be

difficult to match with the promotion of ICT in specific sectors in terms of efficiency of public spending). In theory, most R&D programmes are not linked to particular sectors (i.e. they are horizontal). However, most of them deal with thematic priorities and these are quite often more prevalent in one or a limited set of sectors (e.g. it is clear that biotechnology or aerospace-related actions only benefit some sectors, so in fact these thematic priorities could be considered more vertical than horizontal from a sectoral point of view) This set traditionally involves mainly very technology-intensive and goods-related firms. Therefore, actions towards BR services should explore:

- Both services R&D made within manufacturing and service firms, and research into services made by companies, universities and research centres (i.e. on the one hand R&D directed towards a new product, process or organisational innovation, and, on the other hand, socio-economic research into service innovation, as a sort of basic research) To perform this objective, a preliminary step should be to assess the participation of the service-related topics and sectoral & activity breakdowns in framework programmes and other research and innovation actions. There is a lack of data by sector and topic indicating who is receiving the public funding and which type of service activity is taking benefits out of it. When presenting the results of framework programmes and innovation policies, the place of services should be quantitatively demonstrable.
- Inclusion of thematic priorities specifically relevant to Business-Related Services in framework programmes and detailed working programmes.
- The real openness of other thematic priorities and horizontal actions for BR services. It is suspected that there is a lack of true horizontality when nominally horizontal programmes de facto exclude service innovation activities, either partially or totally.
- A particular focus on the socioeconomic research programme since part of service research and research into services could eventually have a place in that programme.
- Screening the particular role of Knowledge-Intensive Services in R&D and innovation policies and the effects these activities have on clients' firms and the entire economic system.

4) Identification and promotion of best practices

Identification and promotion of best practices – and hence support to policy learning in services' R&D and innovation policies. These policies are now being accumulated in leading countries. In particular, two types of benchmarking exercises can be promoted.

- Benchmarking exercises to identify the areas in which cooperation between service companies and academia, universities and other research centres have been successful and could be expanded further.
- Benchmarking exercises to identify best examples of BR services-oriented policies made by EU member states and regional administrations and local development agencies.

5) Promotion of skills, business models and voluntary standards

This could involve the design and implementation of activities aiming to increase R&D awareness and the management skills of services firms (and the facilitating role that trade and professional associations could play herein). Particular attention should be given to the

development of new concepts for vocational training, taking into account the mutual interests of employees and employers in raising the overall level of skills in all service sectors, and ensuring the greatest possible degree of flexibility and mobility in the context of the continuous social dialogue. Another policy area could be the support for services' firms upgrading their innovation management and encouraging the on-going formalisation of services innovation processes. The latter, for example, by supporting the emerging discipline of "service engineering" or "service science" which aims to provide methods and tools that can be used systematically in the development and prototyping of new service offerings. However, care should be taken to avoid a "one size fits all" approach here, or "tech fixes" that contribute little to service quality.

6) Screening of relevant Commission policies to assess how they contribution to services R&D and innovation

Existing EU policies on services stem from several DGs and Commission services. Further coordination or reinforcement of synergies could be evaluated between:

- DG Research as the main EU actor in promoting research among European countries;
- DG Enterprise and promoter of innovation policies;
- DG Internal Market and Services, as the body responsible for Services;
- DG Competition, to advise what services research can be publicly funded without distorting the competition law;
- DG Region, to assess the anticipated role of BR services in performing innovation programmes following the 2007-2013 guidelines for Structural Funds;
- DG Employment, to assess the needs of skills in services and service employment challenges;
- DG Information Society, to deal with the role of services, Knowledge-Intensive Services in particular, in helping to achieve the success of information society policies and, at the same time, to estimate how far the whole range of services is the receiver of Information Society polices (i.e., BR services as promoters and receivers of information society benefits).

7.3 Research and statistical implications

There are numerous research and statistical implications which can be derived from the analyses reported here. Here we will flag what we see as the most important research and statistical issues linked to the overall messages as presented in section 7.1, hence concentrating on R&D and the R&D function in (business-related) services mostly. Basically the suggestions deal with:

a. defining and measuring service R&D

b. managing service R&D and innovation at the firm-level

c. managing services R&D from a macro or systemic policy perspective

Obviously most statistical implications are treated when dealing with category A. The points raised under category B mostly deal with management issues at the firm level and is primarily a task for firms and professional and industrial associations. However, they could benefit from service innovation research. The implications mentioned under category C can

be seen as a predecessor of the policy implications and are mostly issues to be dealt with by policy researchers.

Ad A: Defining and measuring service R&D

There still is a considerable lag in terms of coverage and detail in which R&D in services is defined and measured (both classical and more widely defined R&D). Although it is first and foremost statistical agencies that need to work on this and redress the results of years of neglect – and this is evidently recognised by many such agencies, that have been devoting more effort to this area - the community of service researchers could help by:

- *Two-track approach to service R&D and innovation*. This involves providing more consistent definitions and typologies of service R&D and innovation. It makes sense to stick to the well established classical definition of (technological) R&D for making firm-level cross sectoral and cross-national comparisons.[81] In that context it would make sense to explore the extent to which international differences in recorded services R&D reflect different sampling, categorisation and measurement approaches, rather then substantive variations in the activities of similar firms. Not only are cross country comparisons within the EU troublesome, a detailed analysis of the US and other non-EU-cases would be particular helpful as well.

  However, it would at the same time be good to develop an alternative track with (broader) definitions of service R&D that would include R&D and innovation categories that are more common to service firms in parallel. Service researchers should be prepared to critically challenge the assumption that "classic" R&D is the royal road to improved service performance in terms of quality and productivity. What other types of measure of innovation might be needed to achieve a fuller understanding of the processes here in this alternative track? The danger of sticking to the dominant first track is that a bias is being established toward R&D that is detrimental to other aspects of services innovation. One practical idea is to continue efforts in the Voorburg group and elsewhere to improve comparability of service R&D and innovation data and to improve the quality of services data in general.

  A further possibility is – apart from counting R&D expenditures and R&D personnel and crude self assessments of innovativeness – to experiment with alternative indicators which start for instance from the knowledge intensity, characteristics of firms in terms of occupations, innovation intensity or strategic intent regarding innovation. This would in fact imply to explore further radically different approaches to measuring R&D and innovation intensity in firms in general (the alternative track). Another activity to be pursue under this alternative track would be to develop instruments for measuring social science R&D, differentiating this from more routine market research, and matters that are more properly understood as aesthetic creativity, etc. Service researchers and statisticians need to explore the extent to which these activities are concentrated in services, and their impact on services' R&D statistics.

- *Take into account the role of size in service R&D and innovation.* In order to understand services R&D and innovation better we need to look more detailed into the way in which large R&D performing service firms are dealt with in especially R&D and innovation statistics on the one hand. As they are so important for the overall picture, it is critical to assess whether all their efforts are attributed to one

[81] The new Oslo Manual (Eurostat/OECD, 2005) also addresses organisational innovation in a constructive manner.

or more industries. If all the R&D efforts of mostly multi-trade service firms for example is attributed to one industry the resulting statistical picture may be highly skewed. Some retailing or financial service firms are having considerable R&D in logistics or ICT. Likewise some manufacturing firms are still regarded – also in statistical terms – as one hundred percent manufacturing firms while in practice large chunks of their R&D portfolio is in services. One can even imagine that the R&D and innovation efforts (possible for some years) of a couple of mostly multi-trade service firms is attributed to various industries to make them more realistic.An analysis of how both the top-10 R&D performing service firms and the top-10 R&D performing manufacturing firms in individual member states – with R&D still defined in the classical way – are treated in the statistics would be very informative already. On the other hand we have to analyse the numerous smaller scale R&D and innovation intensive service firms that make up the tail of the highly skewed distribution of R&D efforts among service firms and analyse whether their hidden R&D component is significantly larger than in larger service firms. This will be difficult as their R&D efforts are even less well defined and hard to separate from regular business activities.

- *Pay attention to forgotten service R&D and innovation categories.* One of the major challenges in the upcoming years will be to analyse in detail how the ways in which firms that most of us still perceive as product-based manufacturing have changed into service firms and assess how this impacts upon the (fading) manufacturing-services dichotomy. This could for instance be done by analysing in detail how both service and manufacturing firms deal with innovation in typical service functions such as R&D, marketing, producer-client interaction and so on and so forth. Most hybrid firms that enter into service R&D and innovation have on the one hand still to overcome their inherent manufacturing bias, however, they seem more inclined to more systematically deal with service R&D and innovation. More formalised service R&D and innovation strategies and practices can ironically possibly be found in these firms. Addressing R&D and innovation in hybrid firms and starting for example communities of theory and communities of practice on these – both aimed at developing and sharing knowledge and best practices – seems to be a promising avenue. The more so as in quite a number of EU-countries service research programmes have just started or about to start. Another forgotten service category which needs to be looked into more deeply is R&D services. Their coverage in current statistics is piecemeal, while their role in diffusing knowledge on R&D and innovation towards client firms is – typical for the ultimate KIBS – possibly far greater than anticipated. The development of R&D services also need to be linked to the wider policy discussion as to how current intermediaries and R&D institutions are well positioned to help service firms in becoming more innovative.

- *Invest in analysing the link between service R&D, service quality, service productivity and their link to economic performance.* A key issue that statisticians and researchers are struggling with is service productivity and linked to this the way to treat (mostly increases in) service quality. Although this problem is on the research agenda for some decades now, some basic problems such as Purchasing Power Parities in service or dealing with quality improvements when assessing service productivity are still major problems. These type of problems need to be solved first before we can sensibly analyse how service R&D and innovation efforts, productivity development and eventually overall firm performance linked? It would be most challenging to estimate the influence that alternative approaches may be having on comparative data, and whether there is scope for using improved measures to examine the performance impact of R&D (e.g. on innovation rates, on

productivity and service quality, etc. This will require firm-level rather than aggregate analysis.

Ad B: Managing service R&D and innovation at the firm level

Management of service R&D and innovation is poorly developed in most firms, as especially the case studies demonstrated. Some of the major challenges that firms were struggling with inspire the firm oriented research agenda set out below.

- How to manage the change in role from a product-based manufacturing firm into a mixed manufacturing and service firm. Typical issues that these firms have to deal with is adapting centrally organised approached to R&D to more distributed or open forms of innovation? In fact this typically is not only a question of revising R&D and innovation strategies, but deriving at new business models as well. Typically there is much scope for mutual learning here and exchange of best practices and possible a role for professional associations is needed.

- How can a structured service R&D and innovation agenda be developed? As more – especially larger - service firms do formalise their R&D and innovation strategies, there increasingly is a need for systematically deriving at these strategies. Current management handbooks or business courses are predominantly based on managing R&D and innovation in manufacturing and less so on managing service R&D and innovation. In fact the majority of educational institutions and research infrastructures are biased towards manufacturing, and there is a need to design innovation systems that are better geared towards the needs of innovative service firms. (Similarly popular tools such as roadmapping are mostly geared towards technologies.)

- What roles can technology/ies play in making service firms more innovative and how does this translate into new organisational and workplace design? There is a need to integrate service engineering, service quality, and service innovation lines of work in order to better understand the roles of R&D, design, and related activities in service innovation processes.

- In what way do typical service firms, as well as more hybrid (mixed manufacturing/service) firms, use technology for service development? To what extent are these firms drawing on new technologies in the process of developing and implementing new service offerings. One example is the use of virtual reality to present and assess alternative environments for services delivery. How can, in other words, mostly new ICTs help in innovating the R&D process in service firms? Can the resulting service labs develop into a shared facility? In a similar vein service prototyping – adapted process models in service innovation - can possibly be used to speed up product development in the services sector. There seems to be a growing demand for such models as competitive pressure is building up in most service markets'.

- Analysis is needed of the international dimension of service R&D, and what the appropriate policy responses to this might be. As increasingly complex manufacturing and service operations are outsourced and offshored, an analysis as to how the future international division of (R&D) labour in service R&D would look like is highly relevant. What sort of service R&D activities can be moved quite easily and what sort are hard to move around the globe? If R&D-functions are increasingly internationally mobile, what sort of service R&D functions should Europe preferably keep, and how? In this context there is a need to analyse in more detail how far services internationalisation (and offshoring) supports service R&D in specific locations, and

the changing management of services R&D. Service offshoring affects not only routine back-office processes but also high value added services that may be conditional to the international location of service R&D.

- Another challenge that the service innovation research community has to address concerns the changing roles of services in different innovation systems and networks. This is not just a topic for conventional analysis, we would suggest undertaking action research where appropriate to integrate (a wider range of) services more closely into selected networks. For instance, the networks that are being established around emerging technologies (biotechnology, nanotechnology, new generations of ICT, converging technologies) can engage with the service firms that are often likely to be their major users, or who will form major intermediaries between hardware suppliers and the end-users. It is likely that developments in for example genomics, neurosciences, and ambient intelligence and locational technologies will have many applications in services (as well as stimulating new services). Action research (and research linked to training) might also be applied to examination of how a more proactive, pro-innovation culture can be created in services.

Ad C: managing services R&D from a macro or systemic policy perspective

In chapter 6 especially we considered the rationale for service R&D and innovation policies and introduced three approaches to facilitating services' R&D and innovation. Adopting any of these has serious policy implications as discussed in section 7.2. However, the idea of having service R&D and innovation policies is not very well established yet and also raises numerous research questions which need to be answered in the years to come. A small selection of relevant research questions are given below:

- Market failure and their relevance to service R&D and innovation. In chapter 6 we touched upon the topic of market failure in relation to service R&D and innovation policy. Although we tentatively concluded that market failures exists in services R&D, a detailed practical analysis of especially spillovers in a number of different service industries would be needed to address this issue more fully. We need to address the controversy as to whether (or more probably, which) service innovations are more readily imitated or actually more challenging for followers. This argument has implications, *inter alia*, for the rationale for public R&D support, and for IPR policy and strategy – which suggests yet another topic for research: relations between R&D and IPR issues in services. In this context OECD noticed that "services firms typically do not regard weak protection of intellectual property as a major barrier to innovation: they rely more on secrecy and lead time to protect their competitive advantage. Nevertheless, IPR could become more important as competition increases and market fragmentation declines" (OECD, 2005a, p. 23). So, the need to look more detailed into IPR and services might increase simply as the technology intensity of services tend to rise as well as their R&D and innovation intensity.

- Another policy research issue is how to more directly involve services into public R&D. OECD for example observed that "public spending on basic R&D, in both public laboratories and universities, does not typically address the long-term knowledge requirements for services, e.g. in improving the understanding of how technology should be deployed and used or of how people work in groups. Developing such long-term research needs would benefit from a greater involvement of services firms in the formulation and implementation of research." (OECD 2005a, p. 22). What options are available to involve service firms more directly in formu-

lating national and indeed European research agendas? One might also raise even wider questions such as what “open innovation models” might look like in service innovation processes, and what examples are available where such models are actively promoted in services?

- How are policies aimed at facilitating service R&D and innovation in various countries actually designed? How do effective innovation and technology diffusion policies that can overcome barriers to innovation and technological change in the services sector look like? We know of various examples of these, but a more detailed analysis might help in deriving a better understanding of what are design criteria for such policy programmes and measures. Here we can also raise the issue of policy mixes and development of what has been labelled systemic instruments to better address services R&D and innovation.
- Apart from designing services R&D and innovation policy mixes a separate issue is how non-innovation policies can be used to the full in triggering service R&D and innovation. Apart from regulation, policy areas that spring to mind as having a direct effect on the scope for R&D and innovation in services are policies in the areas of education and research, labour market, regional development, competition and entrepreneurship and so on and so forth. How can these policies, which are not designed for supporting R&D and innovation, be used most effectively to facilitate innovation in service functions?

Summary

For a long time, policies aimed at facilitating R&D and innovation have focused on supporting technological R&D and technological innovation in mostly manufacturing firms. With the increasing importance of services, the role of R&D and innovation are being recognised as vital for growth and employment in the service sector. Although it is well known that service innovation is driven by much more than R&D alone, R&D is relevant in many service firms as well. Some service categories have technological R&D investment levels comparable with manufacturing, whilst other service firms benefit from technological R&D performed by others. In addition non-technological R&D is particularly relevant for innovation in services but also of great importance in manufacturing as well. However, in practice most (but not all) service firms still only marginally, if at all, participate in current technological R&D and innovation programmes, and their needs are not very well addressed by wider innovation policies. Policies and programmes tend to be developed mostly with manufacturing and technological R&D and innovation in mind. The number of more dedicated services R&D and innovation programmes aimed at services are limited, and are the exception rather than the rule.

Issues addressed and approach adopted

Two issues were analysed within the Research and Development Needs for business-related Services study (RENESER) reported here:

1. Apparent underinvestment, or 'R&D deficit', of individual European business-related (BR) service firms in R&D, especially if compared to their US peers. This issue is largely based on the observation that, given the sheer size of the wholeservices sector , much of the Barcelona target of devoting 3% of GDP to R&D should in practice be met through servicesfirms. It has been highlighted that 50% of value added in the EU economies stems from services, although these services only account for 13% of R&D expenditures.

2. Links between BR service firms and the existing science base. Low private R&D spending in services is apparently not necessarily being compensated, or offset, by public spending on R&D relevant to service firms. This raises questions as to what degree public R&D expenditures are satisfactorily addressing the real R&D needs of service firms. It also raises the question of what policy options are available to improve on this current predicament.

These issues set out above were addressed by:

A. secondary analysis of international comparative statistics and national sources on services' R&D and on the actual participation and use by (BR) services of public R&D programmes;

B. 21 in-depth case studies in (mostly) major European BR-service firms. These case studies were mainly used to assess how the R&D strategies and functions of BR service firms are developing and the trade-offs that are associated with this process. Case studies were performed in distributive trades (Ahold [NI], El Corte Ingles [E], Metro [G]); Network services (DB Dialog Telefonservice [D)], Iberia [E], Metro de Madrid [E]), financial services (Banco Santander [E], Norisbank [D], Rabobank [Nl]), Knowledge Intensive Business Service (Fujitsu Services [UK], Independent Television Facilities Centre [UK], New Product Design and Development [3 micro firms, UK],

Network Research [UK], Randstad [NL], Telefonica I+D [E]), R&D services (DIN Deutsches Institut für Normung e.V. [D], Fraunhofer-Gesellschaft [D], Roke Manor Research Limited [UK]) and Services' R&D in manufacturing firms (Aptium Oncology [UK], OCÉ [NI] , Siemens Medical Solutions [D]).

C. four topical analyses on 1) the rationale for services R&D and innovation policy; 2) participation of business-related services in public R&D programmes (and in particular in the European Framework Programmes); 3) services' R&D as performed by manufacturing firms, and: 4) the particular role of R&D services in service innovation.

The overall findings are reported in more detail in the various chapters of this main report as well as in the various RENESER working papers. Here we concentrate on the main findings, three approaches to services R&D and innovation policies, and the wider implications for policy, research and statistics.

Main findings

a. Services and Business-Related Services are extremely varied; this implies that they should not be treated as a homogeneous category of businesses.

While the study has raised numerous issues that are important for policy and future research on services and R&D, for practically every generalisation that is made, there will be many exceptions. This reflects the immense diversity of services in general, as well as the diversity that exists more specifically within BR services. "One size fits all" will not do. Moving to such an approach would be as unhelpful as allowing a manufacturing-dominated frame of reference to persist. Action and research alike will have to be sensitive to differences across (BR) services sectors and firm types, and be prepared to take these into account in designing and implementing interventions and measurement instruments.

b. There is typically relatively poor integration of (most) services into R&D and innovation systems.

Most service firms are poorly linked to the science base and innovation and R&D programmes. This partly results from (often implicit) manufacturing bias in existing R&D and innovation policies. Formulation of such policies typically fails to reflect the role of services in R&D and innovation systems. "Open" models of innovation feature quite prominently in most cases examined in our research. But there is considerable room to improve R&D collaboration between service firms and research organisations, not least in BR service industries. Broadly, research needs of business-related services are not well met, and the reasons for this relate to (a) service firms that do not articulate their needs properly, and (b) R&D and innovation infrastructures that are not well geared towards service R&D. The latter can be seen as a fault in the particular innovation process at hand, or as part of a more systemic failure.

c. There is room for boosting R&D in BR services in the context of the Lisbon strategy.

Some service firms do perform classic (i.e. technological) R&D and use classic R&D performed by others, but across the board services are still poor performers of classical R&D. In fact, some service firms and sectors are R&D-intensive, but the vast majority of officially recorded R&D undertaken by service sector firms is undertaken by firms in three sub-sectors: computer and related services, telecommunications, and R&D services. The technology intensity in services in general and in BR services in particular is on the rise in most EU countries (albeit from a small base) and might lead to more

technological R&D eventually, but at the same time this effect is obscured by increased outsourcing of R&D, growth of technology-related services (a change in economic structure) and improved statistical coverage. The net effect is, therefore, still hard to assess. Nevertheless, it can be concluded that there is scope for many services to increase their engagement with "classic" R&D, both as producers and users of the activity. Given the sheer size of the service industries, and the ambitious Barcelona target, service-related R&D conducted both within firms and across 'systems of innovation' will be crucial for meeting the Lisbon goal and enhance competitiveness of Europe.

d. Service R&D is still widely underestimated.

Service R&D tends to be underestimated, even if we focus on classic R&D. This underestimation is in the first place due to the "non-standard" management of innovation in most services. However, in practice important services' R&D activities are hidden behind labels such as business development, service improvement, etc., without being recognised as services' R&D. The observed underestimation is also the result of a de facto exclusion of social science research from R&D survey instruments. But if we cast our nets somewhat wider, and also include some non-classical forms of R&D, the underestimation looks even more serious. Many services engage in R&D-like activities that fall outside of, or at the boundary of, the classic understandings of R&D. The non-reproduction of many service innovations produced "on the job" or client-specific solutions is a related problem, for service innovation management as well as for policy and measurement. These issues can only be dealt with if a wider, more services friendly, concept is adopted. Finally, service R&D in manufacturing firms seems to be a forgotten services R&D category. This omission can only be dealt with if services activities, rather than (or as well as) service industries, are taken as a point of departure when analysing (service) R&D.

e. Formalisation of services R&D in leading-edge firms and industries is on the rise.

Increasingly, leading-edge service firms show some form of structured attention to services' R&D and – even more so – to service innovation activities. Although formalized service R&D strategies, budgets and processes are still lacking in most cases, there is a trend in quite a few of the larger business related service firms analysed in this study towards some formalisation of planning, management and resourcing of services R&D&I. However, formalised, service-only R&D is the exception rather than the rule. We observe, however, in some large and innovation-intensive firms (especially those where R&D is embedded and formalised), that the simple distinction between R&D relating to goods, technologies and services is already felt to be obsolete.

f. Measurement problems are persistent and obscure the contribution of services to innovation, productivity and economic growth

The major issues regarding the measurement of services' R&D (in addition to the wider issue of measuring organisational and other softer forms of R&D) are intrinsically related to the services low-tech heritage, the "invisibility" resulting from lower levels of formalisation of R&D in services (fewer dedicated R&D specialists, less formally established R&D departments, less formal R&D management, quite often for good reasons!) and the lack of attention to social science research-based R&D. Similar measurement problems are prevalent when assessing productivity and quality improvement issues in services. It is therefore almost impossible to assess with any

degree of accuracy how service R&D contributes to productivity and eventually economic growth. There are no quick “fixes” to this problem.

g. Apart from some BR services, innovative service firms are less likely to receive public innovation support than are their manufacturing counterparts.

The proportion of innovative service firms that receive financial and other support for their innovation activities varies widely across Europe. But for services at large there is evidence (from CIS III data for a selection of EU countries) that they receive less support than innovative manufacturing firms. There is also considerable spread among service industries. Amongst innovative services, business services are, in most of the EU countries analysed, substantially more likely to receive support than are other services.

h. Furthering R&D and innovation in (business-related) services requires a systemic perspective.

Adopting a systemic policy approach in relation to service R&D and innovation has several implications: firstly, making sure that various actors and institutions in the overall innovation system are well aware of the importance and role of services; secondly making sure the various actors that can potentially play a role in furthering service R&D and innovation are well connected; and finally, adapting the policy to the needs of a service economy. This also means using a larger variety of innovation indicators, and development of systemic policy instruments that take into account the characteristics and needs of services and service functions. Eventually systemic service policies also imply the adoption of appropriate mixes of policy roles to further service R&D and innovation ranging. These roles may vary from financier, supporter, broker, legislator and regulator, supporter to purchaser.

i. Adopting a systemic perspective also implies going beyond the market failure argumentation that is common to legitimate policy efforts

The sheer scale of (BR) services in terms of employment and value added is a practical argument for advocating services R&D and innovation. The importance of these services for the rest of the economy strengthens this argument. This inevitably leads up to a more fundamental discussion whether market failures (such as externalities, information asymmetry, scale economies, market power) apply to services as well. Indeed, the strong heterogeneity of services makes it difficult to generalize about the prevalence of these market failures. However, as long as there are long and costly learning processes in combination with relative easy imitation it is likely that there will be economy-wide underinvestment in service R&D and innovation. This provides grounds for considering a R&D and innovation policy that more explicitly pays attention to services sectors and functions. Adopting a systemic perspective also implies moving beyond market failures and look at various types of systemic failures. The study concluded that there clearly is room to improve the way in which we facilitate and support services, services R&D and innovation as part of wider innovation systems. As well as directly shaping R&D and innovation policies, this also requires examining and designing policies with other objectives (e.g. education and training, environment, intellectual property, public services and procurement, and many other areas).

j. A more pro-services R&D and innovation culture is essential

Europe is still suffering from an underdeveloped services R&D and innovation culture and a lack of pro-services R&D and innovation culture in policy makers. This may be related to the fact that the majority of R&D-performing service firms are not that well connected to the R&D and innovation policy scene. Creating an innovation culture that

is more suited to services' R&D and innovation (in firms, in industries, and society-wide) is the key to successfully growing competitiveness through services' R&D and innovation.

The assimilation, demarcation and systemic approach to services R&D and innovation policies

In this study three approaches to services R&D and innovation policies were examined i.e.: assimilation, demarcation and synthesis or systemic approach. Applied to policy-making the assimilation approach would not imply a specific services R&D and innovation policy rather than increasing the relevance of existing generic R&D and innovation policies to services. Current R&D and innovation schemes should cover services industries as much as possible, as there are no theoretical or practical reasons justifying the exclusion of services. Some horizontal measures that take the services role more into consideration are required. In fact this approach could be seen as the "no regret" scenario.

The demarcation approach starts from the idea that services have specific characteristics and needs which would require services specific R&D and innovation policies. Heterogeneity of the service sector at large, and the fact that not all services have the same problems or the same behaviours, would lead to the need for specific measures in particular markets. From this perspective a horizontal policy is not enough to fulfil the interests of such disparate sectors as telecommunications, tourism, commerce or professional services. For instance, if there are whole sectors excluded from current R&D programmes, the consequences of such a situation must be analysed together with more appropriate methods of promoting R&D in those specific sectors and this may lead to specific, vertical policy initiatives.

In the synthesis or systemic approach services are perceived as a systemic dimension of economic activity and thus a potential focus of innovation practically anywhere. Existing and new policies should deal with the service dimension in any sector. It also includes two specific objectives. Firstly, the inclusion of intangible elements as objects of R&D and innovation policies implies the acknowledgement that there are organizational aspects in the production of all businesses and that intangibles have a decisive role on innovation and growth. Innovation on the basis of 'soft types' of knowledge is relevant for deriving at innovative combinations of goods and services and eventually competitiveness. Secondly, its objective is not only to promote organizational improvements in manufacturing companies or R&D and innovation in service industries and firms, but also to improve the relationships between goods and services producing industries and firms. Policy initiatives starting from this perspective would go beyond the services/manufacturing distinction, and take a broad approach to innovation, treating both R&D and innovation as well as 'non-innovation' policies as way of supporting R&D and innovation. Services R&D and innovation is understood as a horizontal element affecting the whole production system, and the lack of services R&D and innovation as a failure of the system. Services are not only understood as an economic sector, but also as a horizontal dimension of the overall innovation system that may boost overall innovation and competitiveness. In some case these two roles are hard to separate. This has especially been noted for the role of Knowledge-Intensive Business Services (KIBS).

The scheme below provides examples (and is therefore not exhaustive) of assimilation, demarcation and systemic policies aimed at facilitating services R&D and innovation

	Assimilation policies	Demarcation policies	Systemic policies
R&D policies	• Increase accessibility of existing R&D support schemes • Inclusion of services in technological foresight & road mapping exercises • Include services firms in policies aimed at improving industry sciences relationships	• Support public R&D in services • Introduce vertical R&D programmes aimed at service industries (logistics, trade, etc.) • Services IPR instruments • Create dedicated CoE in services R&D at RTOs and HEIs • Increase role of the humanities in service innovation	• Understand and support role of R&D services (KIBS) in innovation systems • Support for services R&D in and through hybrid firms • Integrated R&D programmes paying attention to technological and non-technological R&D and innovation
Innovation policies	• Increase accessibility of existing Innovation support schemes • Innovation management training & practices more geared towards supporting all types of innovation in all industries • Mobility schemes no longer limited to QSEs	• Introduce courses on services innovation management • Awareness campaign on the importance of services innovation • Identify service innovation role models (including innovation in public sectors)	• Innovation & business support systems also supports services innov. • Availability and use of specialized services / KIBS • Increase transparency in KIBS markets • Insight into & international competitiveness of key service functions • Cluster and network type of policies that deliberately include services • Government procurement policies • Support role of users in innovation

Non-innovation policies	• Increase coverage of services in regular and R&D and innovation statistics	• Use deliberately policies such as trade, competition education & training policies for fostering R&D and innovation in services • Regulations that might trigger services innovations • Analyse offshoring in services	• Use regulation & standardization to support innovation • Financial and credit systems that acknowledges intangible assets • Enhance high level service capabilities e.g. through education & training policies • Policies aimed at increasing entrepreneurship

Policy implications

The above overview indicates that in principle there are numerous options to facilitate R&D and innovation in BR services. However, this cannot be realised overnight and has serious implications for the way that policy-makers deal with services, as well as services R&D and innovation in the years to come. In total six policy implications were identified (and discussed in more detail in section 7.2) namely:

1) Creating a more pro-service innovation culture at different levels: enterprises, innovation managers, researchers, workers and policy-makers. The Commission is well positioned to launch public and policy debates by establishing high-level groups, forums, workshops or other types of awareness activities. These interventions would aim - inter alia - at making the science base more responsive to the R&D needs of (BR) services.

2) Promoting studies, debate, research and statistics. A major part of the awareness strategy could be linked to the promotion of research and statistics in services R&D and innovation as a way to increase knowledge, promote debate, and provide better and more informed policy decision-making on services and services R&D and innovation. In our view these issues could be taken up most appropriately in the context of policy design, for example when evaluating (ex ante, ex post) innovation programmes.

3) Assessing the sectoral balance of R&D programmes and innovation policies. This may involve, for example, analysing in detail the participation of (BR) services, the need for more horizontal actions, or more thematic priorities in R&D and innovation programmes, in order to assess whether existing and new programmes would benefit (BR) services.

4) Identifying and promoting best practice – and hence supporting policy learning in services' R&D and innovation policies. These benchmarking exercises can be aimed at: 1) identifying areas where cooperation between service companies and academia, universities and other research centres have been successful and could be expanded, and: 2) identifying best examples of BR services-oriented policies made by EU Member States, regional administrations and local development agencies.

5) Promoting skills, business models and voluntary standards. This could involve the design and implementation of activities aimed at increasing the level of R&D awareness and management skills in services firms (and their trade and professional associations). Another policy area could be in supporting services' firms upgrading their innovation management and encouraging the on-going formalisation of services innovation processes. The latter, for example, through supporting the emerging discipline of "service engineering" or "service science" which aims to provide methods and tools that can be used systematically in the development and prototyping of new service offerings.

6) Screening of relevant Commission policies to assess the contribution to service innovation. Existing EU policies that affect the service sectors are managed by different Commission services. Further coordination or reinforcement of synergies could be examined.

Research and statistical implications

Research and statistical implications – broken down into three subsections – are listed below (more details are included in section 7.3).

Ad A: Defining and measuring service R&D

There is still a considerable lack of both coverage and detail in the way that R&D in services is defined and measured (both classical and more widely defined R&D). Challenges for statisticians and innovation researchers alike are, for example:

1. to provide more consistent definitions and typologies of service R&D and innovation sticking to the well established classical definition of (technological) R&D;
2. to develop an alternative track with (broader) definitions of service R&D that would include R&D and innovation categories which are more common to service firms (in parallel with 1);
3. to start experimenting with alternative indicators which start, for instance, from the knowledge intensity and characteristics of firms in terms of occupations, innovation intensity or strategic intent regarding innovation or measuring social science R&D;
4. to take into account the role of size in service R&D and innovation, for example by looking more specifically at how large R&D-performing service firms are dealt with in R&D and innovation statistics, and analysing the numerous smaller scale R&D and innovation intensive service firms that make up the tail end of the highly-skewed distribution of R&D efforts among service firms;
5. to analyse in detail how product-based manufacturing firms are changing into service firms and to assess how this impacts upon the shifting balance in the manufacturing-services dichotomy;
6. to analyse the link between service R&D, service quality, service productivity and their link to overall economic performance.

Ad B: Managing service R&D and innovation at firm level

Management of service R&D and innovation is poorly developed in most firms, as was demonstrated by the case studies in particular. Some of the major challenges that firms were struggling with inspired the firm-oriented research agenda set out below.

1. How to manage the change in role from a product-based manufacturing firm into a mixed manufacturing and service firm?

2. How can a structured service R&D and innovation agenda be developed? Given that more and more service firms – especially the larger ones - have formalised their R&D and innovation strategies, there is an increasing need to systematically develop these strategies.

3. What roles can technology or technologies play in making service firms more innovative, and how does this translate into new organisational and workplace design? There is a need to integrate service engineering, service quality, and service innovation lines of work in order to better understand the roles of R&D, design, and related activities in service innovation processes.

4. In what way do typical service firms, as well as more hybrid (mixed manufacturing/service) firms, use technology for service development?

5. Analysis is needed of the international dimension of service R&D, and what the appropriate policy responses to this might be. Given that increasingly complex manufacturing and service operations are being outsourced and offshored, an analysis as to how the future international division of (R&D) labour in service R&D would look like is highly relevant.

6. Changing roles of services in different innovation systems and networks.

Ad C: Managing services R&D from a macro or systemic policy perspective

The idea of having service R&D and innovation policies is not very well established as yet and raises numerous issues which need to be dealt with in the near future. Some of these are given below:

1. Market failures and their relevance to service R&D and innovation. A detailed, practical analysis of (especially) spillovers in a number of different service industries would be needed to address this issue more fully and, related to this, IPR and services.

2. How to more directly link service firms with public R&D? What options are available to involve service firms more directly in formulating national and European research agendas?

3. How do effective innovation and technology diffusion policies that can overcome barriers to innovation and technological change in the services sector look like? Here we can also raise the issue of policy mixes and development of what has been labelled systemic instruments to better address services R&D and innovation.

4. How can 'non-innovation policies', which are not designed to support R&D and innovation in the first place, be used most effectively to facilitate service R&D and innovation? Apart from regulation, policy areas that spring to mind as having a direct effect on the scope for R&D and innovation in services are policies in the areas of education and research, labour markets, regional development, competition and entrepreneurship.

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Annex 1: Research Methods Statistical Analysis

The statistical chapter was prepared as part of the statistical part of EU RENESER project (specifically workpackage 1 - public spending, and workpackage 2 - private spending). The aim was to provide insight into the current levels of public and private R&D expenditure in services, particularly with regard to the R&D deficit between the US and EU in terms of the expenditures of business related services on R&D and possible illustration of how BRS are linked or are not linked to the science base in European countries.

For this research, eight key statistical publications were reviewed:

1. United Nations Conference on Trade and Development (2005) World Investment Report 2005. Transnational Corporations and the Internationalization of R&D. New York and Geneva.
2. OECD (2005) Enhancing the performance of the services sector, OECD, Paris.
3. OECD (2005) Enhancing the performance of the services sector (Promoting innovation in services) Revised and extended version: October 2005
4. Key figures on Science, Technology and Innovation. Towards a European knowledge area, 19/07/05, European Commission DG Research
5. Foresight on services and R&D - Draft final report (Miles et al Report, 2005)
6. DTI - 2004 R&D scoreboard
7. EU R&D investment scoreboard 2004
8. EU Eurostat - Innovation in Europe Results for the EU, Iceland and Norway, data 1998-2001

In addition, we are grateful for analyses undertaken by Eurostat specifically for this project of the various national third Community Innovation Survey datasets (CIS-3).

The main criteria used for selecting the statistical indicators outlined in these chapters were:

- Showing a direct link to R&D performance of business related services or a direct link to the interface between services and the science base;
- recent figures (from 2000 onwards) ;
- comparable information for the US;
- preferably including a dis-aggregation into a number of service industries;
- preferably including a wide range of countries;

It was hard to meet all of these criteria. For example, although CIS-3 data is very useful for this research, no corresponding information is available for the US.

Annex 2: Overview 21 Interviewed companies

Ahold: Ahold encompasses an international group of local food retail and food service operators. The operating companies (6 Arenas) are supported by the Ahold Leadership Team and a business support office and are governed by the corporate executive board.

Atrium Oncology: Atrium Oncology is a subsidiary of AstraZeneca. Atrium Oncology Inc. is a cancer treatment and healthcare provider, attached mainly to key hospitals across the U.S.

DB Dialog: DB Dialog GmbH is a 100% subsidiary of Deutsche Bahn AG, the largest railway transportation company in Germany. The subsidiary was established in 1996 to provide services, such a hotline, exclusively for Deutsche Bahn. It has 1,400 employees.

Deutsches Institut für Normung: DIN Deutsches Institut für Normung e.V. (DIN German Institute for Standardisation) is a registered non-profit organisation. It provides standardisation services mainly for enterprises. Although DIN is a non-profit organisation, 65 per cent of its overall income is earned by its commercial activities. The rest of income comes from membership fees and promotion funds paid by German industry.

El Corte Inglés: El Corte Inglés is the main company of a consolidated group of companies and its main activity is 'retail". It has department stores, supermarkets, hypermarkets and convenience stores. However, it also includes service activities, including services to companies: Fashion shops, travel agency, ICT, insurance and financial services. In this sector, at national level the company is a clear leader.

Fraunhofer-Gesellschaft: At present, the Fraunhofer-Gesellschaft maintains roughly 80 research units, including 58 Fraunhofer Institutes, in over 40 different locations throughout Germany. A staff of some 12,400, predominantly qualified scientists and engineers, works with an annual research budget of 1,253 million euros. Of this sum, approximately one billion euros is generated through contract research.

Fujitsu Services: Fujitsu Services (FS) is the European services arm of the Fujitsu Group (FG). The company is a major supplier of ICT services and solutions to large clients in the public and private sectors. Its main activities include consultancy, IT solutions, and managed services.

Iberia: Iberia is an international airline group that, from its foundation in 1927, has remained in the market without interruption. The transport of passengers and freight is its main activity, although not the only one. In addition to the airline Iberia, it has three other major areas: Maintenance, Airports and Systems.

Independent Television Facilities Centre itfc: Itfc is a major provider of technical and content support services to the television broadcast sector in the UK and beyond. Headquartered in London, the company supplies post-production and video services including: subtitling; captioning; audio description; preparation, re-purposing and distribution of video-based materials.

METRO: The METRO Group was created in 1996 by the merger of leading German trade and retail companies. In 2005, the METRO Group was present in 30 countries with 2,171

locations and employed over 250,000 staff. The Group's operational business is handled by four sales divisions that operate independently with proprietary sales concepts.

Metro de Madrid: Metro de Madrid is a private company (with a total turnover of 698.35 million euros in 2004) whose legal form is a joint-stock company, managed by the Comunidad de Madrid (Madrid's regional government). The main activity of the company is the railway transport service of passengers around the Comunidad de Madrid, however it has already started to provide other business services such as consulting and concessions services.

Network Research: Network Research (NR) is a medium-sized 'full service' Market Research agency based in London. Activities include telephone interviewing, multi-method customer satisfaction surveying, data interpretation, information packaging and research consultancy.

norisbank: The norisbank has about 1,150 employees. Its headquarters are located in Nuremberg and there are 99 additional branch banks all over Germany. Since 2003, norisbank AG has been a company of the DZ BANK Group, which is one of the major financial service providers in Germany.

Océ: Océ (revenues of 2,677 million euros in 2005) has over the years developed into a major manufacturer and provider of digital document management technology and services. Although predominantly known as a manufacturing firm Océ has over the years added a large variety of services to its portfolio.

R&D consultancies: This case study includes the following three micro companies: Alan Wall, Product Design Understood, Raffo Design. They are engaged in product design and development, usually in close collaboration with their clients.

Randstad: Dutch-based Randstad Group (6,638.5 million euros in revenues in 2005) is one of the largest staffing and human resources service organisations worldwide. Its key asset competence is its deep knowledge of work and work-related processes and detailed understanding of the demand for and supply of labour. Randstad, apart from offering mass customised (traditional) staffing services, is deliberately moving towards higher value-added services (or 'specialities') for which new service concepts and business models are developed. Randstad is increasingly developing into a KIBS.

Rabobank: Rabobank Group, founded as a cooperative of Dutch agricultural banks, is owned by about 269 member banks, and, besides private banking, focuses on the food and agribusiness industry. The cooperative's global investment banking arm, Rabobank International, has about 140 branches in more than 38 countries. The central organisation advises local banks, but this advice is not binding. Rabobank offers a wide range of financial products, with high added value for low costs. Rabobank divides products into non-complex (now about 25 different products) and complex (at least 125) products.

Roke Manor Research: Founded in 1956 the company is now owned by Siemens, but remains an autonomous operation. Roke Manor employed 404 people in 2004, of which 330 are professional engineers and scientists, at its base in Romsey in Hampshire in the UK. Of its current personnel, approximately 85% are employed in research and development. Its own R&D expenditure was 3.1 million euros with a turnover of some 43.9 million euros.

Santander Group: Santander Group is an organisation of financial services, a leader not only in Spain but also in Latin American countries, with a potential market of 800 million people. Its turnover is about 57,102 million euros (31 December 2004) making it the ninth

largest financial organisation by stock-exchange capitalisation, the fourth largest in Europe and the largest in the euro zone.

Siemens Medical Solutions: Siemens Medical Solutions has about 31,500 employees worldwide. In the field of services 5,200 persons are employed. The annual turnover for services worldwide is estimated at about 1.5 billion euros. Its portfolio enhances product bundles with complex products, integrated technologies and supporting services for the high level of quality in the health care sector. Siemens Medical Solutions was one of the first German manufacturing companies that already introduced a new service development process in the early 1980s. Since then, it has developed a whole range of new, innovative services and the service department has become a highly profitable part of the company.

Telefónica I+D: Telefónica I+D is a private company, created in March 1988, dedicated exclusively to research and development and is the leader in the telecommunication sector in Spain. Its activities on a national and international scale, fundamentally relate to improving the competitiveness of the Telefónica Group through technological innovation. R&D activities have been closely linked to the evolution of telecommunications and the social demands in this field.

Annex 3: Interview guide

General information

- What is your position in your company? Please describe the focus of your activities.
- How many employees does your company have? What is the annual turnover?
- How many domestic/worldwide locations does your company have? Where are your headquarters located?
- What are your company's primary products and services?
- What line of business are your customers in? Who are your most important customers?
- In your opinion, how dynamic are your most important markets? What do you think is your market position in comparison to your main competitors?

R&D Strategy

- Please describe the general role of new services within your company (today and in the future). How is the share of new (e.g. less than three years old) services in annual turnover?
- What do you see as services' R&D? Please give examples of recent R&D activities of your company.
- What are in your opinion the main reasons for services' R&D?
- How much do you spend for services' R&D (share of R&D expenditures for services in annual turnover)? How do you measure the return rate of services' R&D?
- What kind of impact do services' R&D have on innovation and competitiveness (e.g. market share, turnover, employment)? If you have US competitors, do you see different approaches in their R&D strategy?
- To what extent is services' R&D linked to other activities in your company (e.g. innovation management)?
- What were the main barriers encountered in formulating the strategy and performing services' R&D in relation to other activities in your company?

R&D Function

- How is services' R&D organised in your company. Do you have a special R&D function? What organisational units are involved in your services' R&D? How many researchers are involved in your services' R&D (# persons,
- # persons holding a doctor's degree, # assistants)?
- What does your services' R&D process look like? To what extent is the process formalised?
- How are decisions about services' R&D organised (e.g. main responsibilities, facilitators)?

- Please describe the qualification of your services' R&D staff. What kind of special training do they get?

R&D Cooperation

- To what extent is your services' R&D linked (formal partnership or just source of information) to other companies (e.g. customers, suppliers, consultants)? Please describe your experiences (including main barriers).
- To what extent is your services' R&D linked (formal partnership or just source of information) to universities and research organisations? Please describe your experiences (including main barriers).
- To what extent is your services' R&D linked (formal partnership or just source of information) to intermediary organisations? Please describe your experiences (including main barriers).
- In your opinion, how important is the external knowledge sourcing for your company? Which of the forms of cooperation above is the most important?

Policy issues related to services' R&D

- Do you participate in public R&D programmes? Please describe your experience (including main barriers).
- What type of R&D policies – aimed specifically at services or not – are most needed for your company?

Annex: Interview information

- Interview partner (title, first name, last name)
- Company (name, location, country)
- Contact information (address, phone, fax, email)
- Interview location and interview date

Annex 4: Key findings and synthesis 21 Case Studies[82]

Key findings case studies

In markets that are becoming ever more dynamic, service companies can no longer achieve decisive advantages through cost, quality or technology leadership alone. There is an increasingly significant trend towards differentiation through innovative services which more and more create a decisive unique selling proposition compared with competitors in many sectors. The crucial challenges for companies are, above all, to continuously offer enhanced or new services in the market, do this more quickly than one's competitors and, at the same time, meet customers' needs and expectations.

The case studies in the "Evaluation of R&D Needs of Business-Related Service Enterprises" Project show that business-related service firms are responding by beginning to tackle Research and Development for services more energetically. Nevertheless, the main focal points of R&D and the way these activities are organised, budgeted and managed are sometimes differently designed when compared to manufacturing firms. The essential knowledge obtained from the case studies can be summarised as follows:

1. Most service firms show some form of structured attention for services' R&D, however services' R&D is mostly less formalised, more distributed, less explicitly managed and funded.
2. Increasing competitiveness and customer needs are important drivers for services' R&D.
3. A dedicated long-term services' R&D and Innovation strategy (and hence management) at the level of the board of management is rare. Formalised approaches for deriving services' R&D strategies are limited.
4. Some service firm show high levels of technological R&D as well as technology-enabled innovation besides service delivery and organisational innovation.
5. Formalised, service-only R&D is the exception rather than the rule. However, in practice important services' R&D activities are hidden behind labels such as business development, service improvement, etc., without being recognised as services' R&D. A lot of services' R&D is also hidden in client-specific solutions.
6. In only about half of the cases were more formal methods for managing services' R&D and innovation portfolios used and at the project level about half of the firms involved also used more formalised (mostly rudimentary models) for new service development.
7. Although open models of innovation feature quite prominently in most cases, there is considerable room to improve R&D collaboration between service firms and research organisations. Cooperation on services' R&D is mostly poorly developed.

[82] All case studies were reported separately. Most of these – not all due to confidentiality –are available upon request from the authors.

8. Most large service firms are not well connected to the R&D and innovation policy scene (apart from the few of them that perform extensive technological R&D themselves).

9. Existing R&D schemes are of limited value to most service firms and most of them find it hard or unappealing to get access to or participate in them. At the same time, nearly all the analysed companies do not have an internal structure for supporting the systematic acquisition of funded R&D projects.

10. There is a whole array of innovation and non-innovation policies that could help service firms become more innovative and eventually more competitive.

11. There is huge potential for cross-firm and cross-industry (lateral) learning.

12. Creating an innovation culture suited to services' R&D and innovation (in firms, in industries, society-wide) is seen as the key to successfully growing competitiveness through services' R&D and innovation.

All in all, the sheer size of business-related services in the total economy, their potential for creating economic growth and welfare (mostly through considerable opportunities for productivity gains as well as their contribution to making manufacturing firms more competitive), the still small, but rising, share of services in R&D expenditure mean that R&D and innovation policy-makers need to seriously reconsider whether they facilitate services' R&D and innovation well enough using the current policy mixes.

From the European political point of view, the objective of turning the European Union into the most competitive power in the world by 2010 does not seem to be feasible, at least by increasing the R&D expenditure to 3% of GDP, as services are left out of the picture to a large extent. The new services directive will also increase competitive pressure in some service industries and most likely the need for services' R&D.

Ahold

1. Introduction

Ahold encompasses an international group of local food retail and foodservice operators. The operating companies (6 Arenas) are supported by the Ahold Leadership Team and a business support office and governed by the corporate executive board.

2. Conceptualisation of innovation and R&D

Ahold's intentions to innovate are implicitly formulated in their mission. More operational affairs ensuing from the mission and strategy are formulated in 'strategic initiatives'. Ahold's business model contains three main elements: (1) Reduce Cost (2) Improve value and (3) Grow new sales. To meet these three business model goals Ahold employs a wide variety of innovative activities. We distinguish four different types of R&D and innovation within the Ahold organisation: (1) New products/product range, (2) New shop concepts, (3) Enabling/facilitating innovations and (4) The Radar/Intelligence function.

3. Why engaged in R&D&I

The (innovative) activities of the operating companies are internally organised around the shared business model, trying to benefit from group synergies and innovation that serve to further reduce costs. Externally, retailers are becoming more powerful in the supply chain but competition is also strengthening. A number of trends forces Ahold to manage innovation in a more formal way and to implement a more sophisticated R&D and innovation strategy, which is lacking now.

4. Organisational arrangements

Until now Ahold's R&D function is not designated or fully formalised within the organisation. No employees are assigned with specific R&D in their job description. Most of Ahold's R&D is decentralised, which means that most of the R&D is performed by several hundreds of employees in the subsidiary companies (at Arena level). Within Ahold there is no strict hierarchy, it can be seen as a management holding structure with different arenas supported by central units. The bottom-up approach used at Ahold has grown historically. 90% of the new products, concepts, ICT and logistic improvements are developed there. Key persons for innovation within Ahold Arena's are category managers and format developers.

The remainder of Ahold's R&D (10%) is centralised and performed by (several) dozens of employees. To conclude the organisational arrangements we point out that Ahold's historically developed decentralised approach entails, besides advantages (regional specific, more creativity) also disadvantages in terms of efficiency and speed.

5. Decision-making on R&D activities

At this moment there is no formal innovation strategy, but this does not mean there are no innovations or development projects. On the contrary, a great deal happens throughout the entire organisation, but what is lacking is an overall framework and standard procedures to organise and evaluate these innovation processes.

6. Formalisation and R&D&I management

Originally Ahold's operating companies (Arenas) have a strong local internal culture and a strong directive style of management. Recently two important changes have taken place. Firstly, Exchanging ideas within the Arenas and learning from each other is given emphasis, reinforcing the synergy effects. Secondly, the Swedish Moberg has introduced a

different style of management from the directive style, precisely into sketching the 'big picture' roughly. So on the one hand the exact content of the message is imposed less, and on the other hand the process of working and the output is being standardised more and more. As part of the innovation strategy development Ahold is standardising their methods of working (like an in-house consultant). Ahold has developed a four phases 'Service engineering model' for Strategic Initiative Development.

7. R&D cooperation

Ahold cooperates with numerous parties with respect to R&D, and in different roles: outsourcing/contracting partner, controlling or facilitating innovation in the supply chain or knowledge building. Not only the choice of partner in the cooperation is important, but also how collaboration can be shaped (Ahold's role). This is looked at for the individual subjects, the strategic significance, and the objective.

8. Participation in publicly-funded R&D programmes

Participation in government programmes is limited, especially taking into account a company with 50 billion turnover. But with regard to participation in publicly-funded R&D programmes a distinction should be made between product development and more basic research. Government policies do not meet the needs of Ahold e.g. in the field of product development. With respect to more basic research, it would be perfect if a model could be found in which large-scale organisations (such as Ahold) were included.

9. Barriers to R&D and innovation

In the different sections we observed several barriers that stand in the way of organising R&D within Ahold.

10. Policy issues

According to Ahold, the points of reference for (the legitimation of) government support should be: The operating companies are often unable to free up any budget or time to carry out projects with a longer scope. The government could invest in such projects from the point of view of the public interest. Ahold occasionally does not have enough strength or budget to invest in totally new sector-transcending technology.

Aptium Oncology

1. Introduction

Aptium Oncology is a subsidiary of AstraZeneca. Atrium Oncology Inc. is a cancer treatment and healthcare provider, attached mainly to key hospitals across the U.S.

2. Conceptualisation of innovation and R&D

The term R&D is obviously recognised within Aptium Oncology and covers a range of activities that involve experimental development work, testing and clinical trail work and software and IT development activities. Significant organisational innovation has been experienced in the company as it has focused down on oncological sector over the last year or so and more is expected as the company positions itself to serve rapidly evolving needs of its key clients, the healthcare sector in the U.S.. Process and organisational innovations have been launched primarily in a bid to introduce greater efficiency into clinical and testing tasks and activities and many are supported by developments in, or new applications of, technology.

3. Why engaged in R&D&I

R&D remains important core to all Aptium Oncology's activities to help it produce innovative solutions to its clients needs. Each of its cancer centres in the Aptium Oncology network is also a research centre, offering patients and physicians the opportunity to participate in clinical research. As such, through the dedicated onsite and corporate research staff and access to the leading physicians and researchers, the centres in Aptium Oncology's research network remain on the leading-edge

4. Organisational arrangements

Aptium Oncology is based on a fairly simple 'hub and spoke' system of organisation and management, centred around its headquarters in Los Angeles.

5. Decision-making on R&D activities

Decision-making on specific projects is undertaken on a largely decentralised basis, although long term strategic decisions are taken at a central, group basis.

6. Formalisation and R&D&I management

Formalisation within projects is tight and highly regulated, although on a wider, strategic level the organisation is run a much more organic, flexible and evolutionary framework.

7. R&D cooperation

There is a high level of cooperation, centred in the hospitals, in relation to its clinical trial and testing work with clinicians and other research organisations.

8. Participation in publicly-funded R&D programmes

Some limited involvement in NIH programmes in the U.S., usually on an indirect basis.

9. Barriers to R&D and innovation

None reported.

10. Policy issues

The key question in policy terms is whether this model likely to develop within the European healthcare and pharmaceutical sectors?

DB Dialog GmbH

1. Introduction

DB Dialog GmbH is a 100 % subsidiary of the Deutsche Bahn AG, the largest railway transportation company in Germany. The subsidiary was established in 1996 to provide services, like the hotline, exclusively for the Deutsche Bahn. It has 1,400 employees.

2. Conceptualisation of Innovation and R&D

In the past, the innovation activities of DB Dialog ware strongly focusing on processes (optimisation, standardisation, etc.) and human resource management (training etc.). Today, the company starts to think about "new service products" which seem to be necessary for entering new markets.

3. Why engaged in R&D&I?

The main drivers are the increase in efficiency and competitiveness as well as the development of services for new markets.

4. Organisational arrangements

At DB Dialog R&D for services is done in several units in the company, but it is not concentrated in one department. There is no distinct R&D or Innovation Department. Departments carrying out R&D for services are "Service Engineering", "Operations" and "Marketing and Business Development". For example, in the department "Business Development" the strategic orientation is devised as well as alliances and internal structural organisation. "Service Engineering" is operating more at an operational level, which in the sense of R&D means the development of the service delivery (production), the standardisation of processes and quality management. The third department is "Operations" where customer requirements, complaints, and requirements for processes are collected and distributed as suggestions for improvement.

5. Decision-making on R&D activities

R&D activities are concentrated on the headquarters, but on different organisational units. An explicit R&D strategy does not exist, but at least the new service development projects are under direct control of the top management.

6. Formalization and R&D&I management

DB Dialog has defined processes for project management, for development of training and for organisational changes. There is also a process for new service development although this is still rudimentary. Besides the formalisation of processes, DB Dialog has also focused on the systematic application of (R&D related) methods and tools (e.g. QFD, FMEA).

7. R&D cooperation?

Cooperation is a success factor for DB Dialog. Cooperation is intensive at different levels: internal (by integrating employees from different departments) and external (competitors, customers, associations, research institutions, experts).

8. Participation in publicly funded R&D programmes?

DB Dialog is currently participating in two German research projects mainly to identify potential for improvement in respect of innovation. There is a high motivation to participate in further projects, but there are still too less opportunities for service

enterprises resp. call centre companies.

9. Barriers to R&D and innovation?

When it was an internal service provider of the Deutsche Bahn group, DB Dialog did not have the opportunity to invest to services' R&D. Its activities were much more focused on optimisation and standardisation. The situation changed when DB Dialog became a more independent subsidiary, but the business is still very closely linked to Deutsche Bahn as the main customer.

10. Policy issues

None mentioned (although requested).

DIN Deutsches Institut für Normung

1. Introduction

DIN Deutsches Institut für Normung e.V. (DIN German Institute for Standardisation) is a registered non-profit organisation. It provides standardisation services mainly for enterprises.

2. Conceptualisation of Innovation and R&D

R&D activities for services are operated in different organisational units in DIN. By distributing the activities, different branches and different stages of the product/service lifecycle can be addressed. While the standardisation committee address branch specific subjects, the department "R&D Phase Standardisation" was implemented to fulfil the needs for standardisation in the R&D phase of products and services.

3. Why engaged in R&D&I?

New services have become very important for the whole DIN Group in recent years. This development was and is still primarily influenced by customer needs. Customer needs have changed to the extent that information and communication technologies have become more and more important.

4. Organisational arrangements

R&D is spread over different functions in DIN (e.g. "standards committees", "staff department for research, education and industry", "project organisation/standardisation", "IT management"). Regarding the qualification of staff involved in R&D for services, a significant number of employees from DIN has a university degree or something similar. An exact number is not known.

5. Decision-making on R&D activities

DIN has established a "special committee for R&D phase standardisation" reporting to the Presidential Board to promote the concept of R&D phase standardisation. The Board comprises high-ranking representatives of scientific and economic communities. It is responsible for the examination of possible areas of interest and, where appropriate, the initiation of corresponding activities.

6. Formalization and R&D&I management

Concerning the process relating to R&D for services, the overall process for DIN is not documented.

7. R&D cooperation?

According to the different players in R&D for services, it is linked to industry, research, science, consumer associations, labour unions and policy.

8. Participation in publicly funded R&D programmes?

At present, DIN is participating in six research projects of national ministries and the European Commission. The current and recent projects have been carried out with positive experiences.

9. Barriers to R&D and innovation?

Barriers are seen mainly in the proposal phase for new research projects. A high quality of proposal and project content is required and the competition with other proposed projects is getting harder. Another point is the intensive effort which is needed to convince evaluators and project partners of the need for and benefits of standardisation.

10. Policy issues

Fields of action for R&D are greater emphasis on the subject “standardisation” within tenders (which means the evaluation of proposals regarding fields of action for standardisation), more investigation in research about standardisation and support of competence networks of standardisation.

El Corte Ingles

1. Introduction

El Corte Inglés is the main company of a consolidated group of companies; its main activity being 'retail'. However, it is also engaged in service activities, including the provision of services to companies: Fashion Shops, Travel Agencies, ICT, Insurance, and Financial Services. In this sector the company is a clear industry shaper at the national level.

2. Conceptualisation

El Corte Inglés regards R&D&I activities as 'The transformation of knowledge into innovation of the service offered (new or improved services), which is recognized by the market and generates value.'

3. Why engaged in R&D&I?

The fundamental driver for R&D is seen by El Corte Inglés as: THE ABILITY TO BE COMPETITIVE, i.e. it develops a defensive strategy in order to increase its market share and position. They are focusing on the customer's real necessities as well as on the internal entrepreneurial necessities and are therefore engaged in R&D activities in three main areas: improving the logistic process for handling, human resources and customer services.

4. Organisational arrangements

El Corte Inglés has about 10 highly-qualified workers constituting their Corporate R&D staff. As soon as a business unit, or the corporate unit has identified a new R&D project, a 'virtual office' is created for its development with both R&D corporate staff and the other resources of each business unit involved in the innovation project.

5. Decision-making on R&D activities

Decision-making on R&D services is done in two stages: the identification of a problem and the project implementation. Firstly, ideas emerge from two directions: strategic management of the Group and the real situation connected with the problem that arises for the direct relationship with customers. Secondly, development of the concrete solution, thanks to an R&D project is carried out by the virtual office for the project.

6. Formalisation and R&D&I management

Innovation is so integrated with the business activity that, in general terms, an innovative process can emerge from anywhere within the organisation.

7. R&D cooperation?

El Corte Inglés considers that collaboration in R&D projects is essential in several areas with the suppliers/customers (mainly SMEs) and with public bodies such as governments and universities. Many R&D projects have been developed in collaboration with other companies.

8. Participation in publicly-funded R&D programmes?

Two of the main R&D projects developed with the aid of European funding are: the ALBATROSS project and the TRITON project Some examples of participation in the Spanish National Plan of R&D&I are: the SECURENET project, the VISIR project and the 9. BIOVISIR project.

9. Barriers to R&D and innovation?

In general, El Corte Inglés is not faced with any serious problems in R&D projects, but the most controversial and problematic stage for them is the implementation stage in the real market.

10.Policy issues

All the measures that generally promote and encourage an 'innovation culture' should be implemented, as well as specific measures which are interesting and encourage the R&D development process. El Corte Inglés proposed that the public administrations promise to purchase the innovation generated by private companies, as it happens in the United States through the Defense Department. This may be a sort of ex-post financing that could act as an additional incentive for increasing private R&D.

Fraunhofer-Gesellschaft

1. Introduction

At present, the Fraunhofer-Gesellschaft maintains roughly 80 research units, including 58 Fraunhofer Institutes, at over 40 different locations throughout Germany. A staff of some 12,400, predominantly qualified scientists and engineers, works with an annual research budget of 1,253 billion euros. Of this sum, approximately one billion euros is generated through contract research.

2. Conceptualisation of Innovation and R&D

Within the Fraunhofer-Gesellschaft, there is a clear understanding of R&D, but the focus is still on technological innovations. As an R&D service provider, its research and development activities comprise two levels. One of them is the very dynamic content-related level, i.e. the (project-specific) implementation of innovations for the customers of the Fraunhofer-Gesellschaft. The other one is the level of its own processes and sets of instruments used for developing and testing new ways of cooperation and transfer of research.

3. Why engaged in R&D&I?

R&D is the core business of the Fraunhofer-Gesellschaft. It develops new technologies, products and services for its customers.

4. Organisational arrangements

The Fraunhofer-Gesellschaft has no central R&D department, but it has budgets for inter-institute projects coordinated by the “Strategy and Programmes” department in the headquarters. Moreover, all the institutes have budgets for self-financed R&D projects. These two types of “internal” R&D projects are mainly used for developing new offerings and opening new markets, but in some cases also for improving the own processes. It is estimated, that more than 20 percent of the annual turnover are spent for internal R&D.

5. Decision-making on R&D activities

Except for the inter-institute projects, the decision on R&D activities is made locally and with the sole responsibility of each institute (i.e. the head of institute and the board of management).

6. Formalization and R&D&I management

There are no standardised processes for R&D projects because of the diversity of institutes and research topics, but at least a focus is on professional project management.

7. R&D cooperation?

In most cases, R&D cooperation is project-based. There are stronger relationships with a few selected universities. Moreover, in the last few years the Fraunhofer-Gesellschaft has made efforts to strengthen its international network.

8. Participation in publicly funded R&D programmes?

The Fraunhofer-Gesellschaft is participating intensively in publicly funded R&D programmes. In 2005, 26 percent of its turnover was generated by this kind of projects.

9. Barriers to R&D and innovation?

None mentioned.

10. Policy issues

From the point of view of the Fraunhofer-Gesellschaft it is particularly important to admit a diversity of ideas and issues also in the future and to further develop the programmes on a continuous basis. Potential for improvement is seen in a quicker adaptation of the programmes to new challenges and a more efficient collaboration of the research organisations.

Grupo Santander

1. Introduction

Santander Group is an organisation of financial services, the leader not only in Spain but also in Latin American countries, with a potential market of 800 million people. Its turnover is about 57,102 million euros (31 December 2004) being the ninth financial organisation by stock-exchange capitalisation, the fourth in Europe and first in the euro zone.

2. Conceptualisation

Santander Group defines innovation as the 'constant search for new products and services to satisfy the customer's needs and at the same time outperform our competitors in profitability'.

3. Why engaged in R&D&I?

The innovation process is key for the Group and is directly related to both customer satisfaction and improvement of the company's profitability. R&D is included in the definition of the company's vision and in the corporate values of the organisation (Dynamism-Strength-Innovation-Leadership).

4. Organisational arrangements

There is no specific R&D Department in the organisation. However, R&D projects are conducted and innovation is carried out throughout the entire company in a non-formalised way as a result of implementing a strong corporate culture.

5. Decision-making on R&D activities

Santander Group attempts to promote 'insourcing' as the best way to achieve its innovation goals. If the new product or service is trying to be commercialised in a country other than Spain, it must first be approved by the Local Committee of New Products prior to approval by the Global Committee of New Products, in order to appropriate them to the targeted market.

6. Formalisation and R&D&I management

A Global Committee of New Products (with the permanent participation of 17 of the company's business units) is in place which is responsible for ensuring that these new products and services are technically consistent, legally correct and adapted to the profile and real needs of the Group's clients.

7. R&D cooperation?

Being conscious of the fact that higher education is one of the main motors of development and innovation, cooperation with the University is one of the company's priorities.

8. Participation in publicly-funded R&D programmes?

Due to the nature of the services that this company provides, it does not normally participate in research projects funded by public bodies, neither at the national nor the European level. Santander Group develops its R&D strategy taking its own financial resources into account.

9. Barriers to R&D and innovation?

There are no barriers specified by the company.

10. Policy issues

It is necessary to firmly promote an innovation culture in general.

11. Other issues arising

The Santander Group considers that autonomy in developing R&D&I projects is fundamental and is consequently not in favour of specific projects being funded by public authorities unless such funding is flexible and efficient enough to cope with the needs of financial services. In any case, public funding should concentrate efforts in promoting a pro-innovative culture in services.

Santander Group has more than 129,000 employees, a commitment to facilitate, develop and improve professional careers, help reconcile work and family life and create an active and mutually beneficial communication policy. This has been achieved thanks to the creation of the Finantial City in Madrid.

Fujitsu Services

1. Introduction

Fujitsu Services (FS) is the European services arm of Fujitsu Group (FG). The company is a major supplier of ICT services and solutions to large clients in the public and private sectors. Its main activities include consultancy, IT solutions, and managed services.

2. Conceptualisation of innovation and R&D

'R&D' is perceived to have a strong association with the development of 'tangibles' (i.e., hardware) in the ICT industry and is thought to be inappropriate to describe the forms of service development activity undertaken by FS. 'Innovation' is the preferred term for the client-focused development work undertaken by the company. FS distinguishes between 'external' innovation (i.e., that designed to meet the expressed needs of clients) and 'internal' innovation (i.e., development work that is designed to improve efficiency and productivity within the company).

3. Why engaged in R&D&I

Fujitsu Services is working in a highly competitive ICT solutions industry where an ability to deliver innovative solutions is a key source of advantage. Innovation is also perceived as a means of differentiating products from those of competitors.

4. Organisational arrangements

FS does not have a formal R&D division or function. However, the 'Business Transformation' (BT) and 'Group Operations' (GO) divisions within the organisation are tasked with the management of external/service and internal/process innovation respectively. FS is not a 'proactive innovator': almost all (client-focused) innovation is perceived to be client-led and responsive or opportunistic in nature (thus an 'open' model applies – FS innovates with its clients and partners).

FS is heavily dependent for its innovation upon research undertaken within FG. The latter is a major investor in technological R&D (approximately $2.3bn pa) and much of the work of FS involves the translation and integration of new FG products into client-specific solutions.

5. Decision-making on R&D activities

Decision-making with respect to innovation activities is governed by the BTG and GO division indicated above. The BTG is charged with the task of evolving core offerings and ensuring that these fit with customer demands - its consultants act as a bridge between FG's R&D laboratories and FS' domain consultants (in Government, Health etc.), advising on emerging technologies and considering how these might be used in the development of tailored services and solutions. Decision-making is generally not 'top-down' (i.e., let by BTG) – much interaction is evident and close interaction is required if BTG consultants are to understand emerging needs/opportunities (at market level), and domain consultants are to generate an understanding of the potentials/functionalities of evolving technologies. The GO is responsible for the setting and pursuit of ambitious efficiency and savings targets within Fujitsu Services and is a major driver for process-focused innovation. Strong internal leadership is evident and the GO is clearly capable of 'forcing through' innovation/change in order to achieve desired productivity enhancements

6. Formalisation and R&D&I management

Whilst there exists a degree of formalisation with respect to the (client-focused) innovation function, Fujitsu Services does not operate with a single, codified or formalised innovation strategy. There is a tendency for innovation to be demand-led and most innovation takes place very close to the client. Internal innovation strategy is a little more formalised and is driven by the pursuit of year-on-year financial savings with respect to operations.

7. R&D cooperation

Cooperation on large IT projects is ubiquitous within the (UK) industry. Fujitsu Services works with other large ICT equipment, infrastructure and services providers (e.g., Microsoft, CISCO, BT), sometimes as a leader and sometimes as a partner in project consortia. Cooperation for R&D and co-innovation is common and frequently involves both consortium partners and project clients. University departments are occasionally contracted to work on the development of specific technologies/functionalities, and some social science-based research (e.g., impacts assessment of service offerings) receives support. Cooperation with HEIs or RTOs is not systematic and reliance on in-house capability for both 'hard' and 'soft' projects is common.

8. Participation in publicly-funded R&D programmes

Fujitsu Services has been involved in some services-oriented projects in FP5 and FP6 but participation is very limited. The company's parent (FG) is a significant player in large technology-focused European RTD projects and FS (albeit indirectly) is able to leverage-off the experience/benefits derived from these activities.

9. Barriers to R&D and innovation

Innovation is generally responsive and few barriers are encountered. However, the company has experienced problems with respect to innovation and organisational learning. Innovation (and co-innovation) tends to be diffuse and takes place close to the client: as a result it is difficult to capture and codify the knowledge that is generated in the innovation process.

'Mainstreaming' innovation - one of the key problems for FS is that much of its innovation is distributed and close to the client and thus hard to capture – the company has been successful in innovating with customers but has no real mechanism for the capture, codification or mainstreaming of its successes.

10. Policy issues

Policies supporting the diffusion and enhanced use of ICTs in the public services (e.g., e-government and e-delivery initiatives) have been a major fillip to both trade and innovation. Increasing 'openness' of markets (especially labour markets) has also increased opportunities for recruitment and for offshoring (a major plank in FS' service offerings and business strategy).

Iberia

1. Introduction

Iberia is an international airline group that, from its foundation in 1927, has carried out business without interruption in the market. The transport of passengers and merchandise is its main activity, although not the only one. In addition to the Airline Iberia, it has three other major areas: Maintenance, Airports and Systems.

2. Conceptualisation

Iberia utilises R&D projects to obtain new products and processes or to improve already existing ones. Traditional R&D activities have been carried out in the areas of Maintenance and Systems. R&D services are focused on new customer services. From 2004 the innovation activity has been considered necessary throughout the whole company in order for it to become a competitive company in international markets.

3. Why engage in R&D&I?

The reasons why Iberia is engaged in R&D activities have undergone a great evolution over the last three years. In the period 2004-2005 R&D projects were considered essential for the stability of the company in business. During 2005-2006 the necessity to promote Iberia's image as an innovative company was considered to have top priority in the R&D activities. From 2006 the R&D activities and their global management for obtaining competitive advantages are considered as the cornerstone for achieving competitive advantages. The activities of the company use R&D activities more and more.

4. Organisational arrangements

The organisation and management of R&D and innovation in Iberia has developed towards a global management based on the company's overall strategy. Initially, the Innovation Unit was linked to the Environment and Quality Unit. After 2004 it was established at the corporate level, being in charge of defining the company's R&D activities. The process has now become more formal and is largely an open model with several ways of cooperating with third parties.

5. Decision-making on R&D activities

All areas within the company are generating R&D projects. There are R&D Managers who coordinate all the new projects inside the area concerned. These projects are then managed at corporate level and developed by the Innovation Unit. All R&D projects must be approved by the Committee of Expenses and Investments of the corporate area that analyses criteria of yield, efficiency and effectiveness. This Committee authorises the Project Director to execute the R&D project.

6. Formalisation and R&D&I management

The work developed by the Environment and Innovation Unit is key in the improvement and systematisation of the R&D processes. It defines the corporate R&D strategy for the company and manages all innovation processes.

7. R&D cooperation?

Iberia has wide experience in establishing collaboration with technological companies, private enterprises, universities and private foundations. This cooperation process enables Iberia to take advantage of their knowledge, as well as their highly-qualified human resources. Iberia thus obtains two main benefits: access to ICT and joint execution of the specific R&D project.

8. Participation in public-funded R&D Programmes?

Iberia has participated in numerous innovation programmes at national level (the PROFIT Programme, the programme of CDTI, IMADE, ZENITH) as well as at the European level (VII Framework Programme).

9. Barriers to R&D and innovation?

The main problems encountered by Iberia in the public aid programmes consist of the following points:

- A long response time in the acceptance of projects
- A delay in the technical audits
- A delay in the liberation of endorsement and collection of subventions
- A lack of programme coordination and aid
- Different definitions of R&D and innovation that make management of the projects difficult and notification of aid and fiscal deductions
- The ex-ante requirements called for by the Public Administration are not in line with the real situation; they request too much information from suppliers, contracts, etc., which in many projects are not known until a later date.

10. Policy issues

It is necessary for the national and European authorities to develop specific programmes for the activities of services. It would be a good idea to consider programmes and public aid on the basis of specific activity, and not on the basis of the productive sector, in order to facilitate the participation of businesses in the services sector. Finally, R&D public programmes should have a longer time frame to ensure continuity of the programmes in the longer term, it would also be easier to develop the whole project.

Independent Television Facilities Centre (itfc)

1. Introduction

Itfc is a major provider of technical and content support services to the television broadcast sector in the UK and beyond. Headquartered in London, the company supplies post-production and video services including: subtitling; captioning; audio description; and, preparation re-purposing and distribution of video-based materials.

2. Conceptualisation of innovation and R&D

The term R&D is widely recognised within itfc (partly as a result of the engineering background of many employees and managers and the technological content of many functions). However, the descriptor 'R&D' is usually applied solely to activities that involve the development of new technologies, components or devices (even where these support the introduction of new or enhanced services). The development of new services is commonly perceived as either 'product development' or 'customer-focused innovation' rather than as R&D per se.

3. Why engaged in R&D&I

One of the key aims of itfc is to bring new services to market (a market environment that has witnessed major expansion - and the entry of new players - in the past decade). The broadcasting industry is changing rapidly and itfc must innovate in order to keep pace with emerging, morphing and new demands (the principle impetus for innovation is competitive positioning). Further drivers for innovation include technological developments, changing business models, regulatory shifts, and changing audience and demand patterns.

4. Organisational arrangements

Departmental heads or directors have a central role in promoting R&D and innovation takes place across the organisation (albeit unevenly). Individual departments are not 'isolated' and co-working and development involving operational, administrative, creative and technical staff is commonplace. Itfc does not have a dedicated R&D division or a dedicated innovation budget. Instead, resourcing for innovation/development is found from general IT, engineering and procurement budgets and innovation-linked work is undertaken in a diffused and inclusive manner (a majority of workers – especially in IT and engineering functions – have some responsibility for working on innovation projects). Because innovation effort is widely distributed and no formal budget is in place, R&D and innovation work is largely hidden.

5. Decision-making on R&D activities

Responsibility for R&D is broadly devolved to the level of departmental directors and much of itfc's more visible (i.e., predominantly technological) R&D is organised and overseen by Directors of Engineering, IT and Video Operations. Departmental directors do not have a formal budget for R&D work but have significant autonomy and are able to use procurement and HR budgets to purchase necessary kit and fund labour input to development-focused work.

6. Formalisation and R&D&I management

Whilst itfc does not have a formalised strategy with respect to R&D or innovation, there is a generalised awareness (particularly among senior technical and operational managers and engineering staff) of the role of perpetual development and innovation in competitive positioning. The absence of a codified R&D strategy does not appear to constitute a problem for itfc - with a relatively small, professional, and well-integrated work-force/management team, there is perhaps little requirement for formalisation (indeed, the flexibility, responsiveness and autonomy afforded by a lack of formalism may be well-suited to itfc's fluxing market and rapidly developing operating context).

Formal (conventional) R&D is much in evidence with development of technologies, devices, techniques, systems (necessarily) occupying an important position in itfc's operations. However, the technology-focused nature of innovation activity should not obscure the fact that development is undertaken primarily in order to support the enhancement of existing services and the introduction of new offerings.

7. R&D cooperation

A large proportion of R&D in broadcasting involves close collaboration between technology users and producers - co-innovation (often involving major consumers and small, specialist technology firms) is commonplace and the industry is characterised by an 'open' and network-based innovation system. Whilst Itfc frequently collaborates on innovation projects with smaller technology producers, it also has a role as an 'innovation broker'. As a large consumer/user of broadcast technologies, the company is particularly well-connected and can be characterised as a 'hub' in the innovation network: as such it is able to bring together companies and individuals with specialist and complementary capabilities.

8. Participation in publicly-funded R&D programmes

Itfc does not participate in publicly-funded R&D initiatives – the profile and perceived relevance of such schemes is somewhat limited. Perhaps more importantly, the broadcasting sector has a history of self-organisation and this is particularly true where innovation is concerned.

9. Barriers to R&D and innovation

The most important barrier to innovation is absence of funding – budgets are tightly controlled and a very strong case must be assembled for the pursuit of innovation projects (especially where this involves the employment of a development engineer).

10. Policy issues

Policy with respect to Disability Discrimination and improved viewer/listener access has been a major spur to trade and innovation – itfc is a leading provider of subtitling and audio description services (i.e., services that meet the needs of consumers with sensory impairments).

Liberalisation of the broadcast industry has implied a reduction in entry barriers and the arrival of new entrants from many different sources (some bringing innovative services and new and 'lean' approaches to the organisation of broadcasting). Whilst increased activity in the sector has provided strong opportunities for broadcast service and support companies, competition in the market is likely to increase in the medium-term.

METRO Group

1. Introduction

The METRO Group was created in 1996 by the merger of leading German trade and retail companies. In 2005, the METRO Group was present in 30 countries with 2,171 locations and over 250,000 employees

The METRO Group is headed by METRO AG, which acts as a strategic management holding company. The group's operative business is handled by four sales divisions that operate independently with proprietary sales concepts. Cross-divisional services such as logistics, information technology and the procurement of advertising media are bundled in cross-divisional service companies.

2. Conceptualisation of Innovation and R&D

Within the METRO Group, the term of R&D is familiar. There is even a separate item for it on the balance sheet. However, the term is only rarely used in day-to-day business. R&D projects operate under the term "Advanced Retailing".
In particular, innovations are intended to promote the use of new technologies which in turn facilitate the design of more efficient processes and ultimately result in cost advantages. For this purpose, new technologies are evaluated at an early stage (and sometimes developed internally), tested in pilot applications and eventually implemented on a large scale. A focus of the activities is on testing in realistic environments as early as possible in order to obtain reliable information about the relevance for practice and to be able to translate the innovations into practical applications very quickly in case of positive results.

Apart from pure technological R&D there are other types of R&D as well within the METRO Group. An example is the project "Menschen über 50" ("People Over 50" – tailoring of markets, processes and products for elderly people).

3. Why engaged in R&D&I?

Safeguarding the competitiveness and strengthening the market position are considered to be the most important drivers for research and development.
In spite of the dynamic characteristic, the market has a relatively low level of innovation. The competition of the large retail companies is driven fairly much by attaining cost advantages, while investments into the development and implementation of innovations do not have a central importance in many enterprises. Significant efforts for innovation are only made by the "big players".

4. Organisational arrangements

Within the METRO Group, there is no separate department for research & development. R&D projects usually involve many different business units of the METRO Group, with Sales playing a particularly important role.

5. Decision-making on R&D activities

An internal 6-member committee composed of employees from the major companies of the METRO Group is responsible for collecting and evaluating ideas. Subsequently the Global Leadership Council decides on following up promising ideas and allocating the corresponding budgets.

6. Formalization and R&D&I management

A formal R&D process has been defined which, however, is not completely standardised and is less static than comparable product development processes of production enterprises. The process consists in collecting ideas, working out business cases, considering the customer's perspective, performing tests and finally the roll-out of new solutions. The METRO Group focuses more on the utilisation of suitable R&D methods rather than on the application of formal R&D processes.

7. R&D cooperation?

Within the R&D projects, cooperation plays an important role and is regarded as a core factor for success. In addition to the suppliers, who are considered as the most important partners in the development of new concepts, the projects typically include consultants, market researchers, logistic service providers, research organisations and (test) customers. Some projects consist of up to 30-40 different external partners.

8. Participation in publicly funded R&D programmes?

METRO participates in public R&D programmes only to a very limited extent. The criticism expressed about public research promotion refers particularly to tedious processes and incomprehensible cuts in budgets in the application phase. However, it is also noted that commerce should increase its presence with the funding organisations and reinforce its lobbying activities.

9. Barriers to R&D and innovation?

None mentioned.

1. Policy issues

Politics and research promotion agencies should have a more distinct perception of the service-sector industries. So far, research promotion is strongly oriented towards traditional large scale industries (e.g. automotive and pharmaceutical industries). Programmes and processes should be adjusted to the needs of service providers.

More efficient processes within the funding organisations are desirable. The application phases involve too much effort and take too long. Especially with the short innovation cycles of many service providers, the official project launch is often too late.

Commerce and logistics constitute the largest economic block in Europe as measured by the employment figures. At the same time, there is a lack of competent contact persons at the EU for the recognition and advancement of new commercial issues.

Metro de Madrid

1. Introduction

Metro de Madrid is a private company (with a total turnover of 698.35 million euros in 2004) whose legal form is a joint stock company and managed by the Comunidad de Madrid (Madrid's regional government). While the company's main activity is to transport travellers around the Comunidad de Madrid by rail, it has already started to provide other business services, such as consulting and concession services.

2. Conceptualisation

Metro de Madrid considers R&D services as process improvements, allowing a more efficient manner to transport passengers, i.e. more comfortably (more space and cleaner) and faster. Metro de Madrid focus its innovation activities on four main areas: the improvement of internal processes, the creation of new services for travellers, the development of technological solutions for the improvement of facilities and the amelioration of accessibility and better services for handicapped persons.

3. Why engaged in R&D&I?

Metro de Madrid is strongly engaged in R&D&I activities because it is seeking to promote the benefits in customer service across the board. R&D&I activities are useful in approaching new business-related services markets in other countries: therefore, R&D is used not only to improve the same type of local consumer business but also to develop new business-related activities in new international markets.

4. Organisational arrangements

The process of detecting new necessities arises from the strategic lines of the company. While there is no formal mechanism for R&D activities in place inside the company, the Coordinator of R&D&I activities determines the start of a project once the company's budgetary restrictions for the year in course have been considered. It does not entail specific R&D human resources, but departmental staff are temporarily assigned to the specific R&D project. The composition of each research team depends on the nature of the project itself. Once the R&D project has been carried out, the results are disseminated in a non-structural way throughout the whole of the company, without the existence of a formally defined channel.

5. Decision-making on R&D activities

The R&D function is the responsibility of a General Directorate that depends directly on the company's Board of Management. All R&D activities are then coordinated by the Board of Engineering, Maintenance and R&D, which evaluates and coordinates all the company's investigation projects.

6. Formalisation and R&D&I management

The R&D structure functions on the basis of projects, the provision of human resources from several departments, and the budgetary restrictions being taking into account.

7. R&D cooperation?

The cooperation process with other organisations is one of the cornerstones of the R&D definition process in Metro de Madrid. There have been many successes in the development of specific joint R&D projects since they are based on the existence of a common interest. In fact, Metro de Madrid becomes a 'laboratory' for certain innovating projects undertaken by the University. The main benefits for the company are the economic and technical support for developing R&D projects, the access to high technology, the source of information and the promotion of further collaboration in the long term.

8. Participation in publicly-funded R&D programmes?

The company has already participated in several R&D European programmes such as the Modurban project and Iberoeka project.

9. Barriers to R&D and innovation?

From an internal point of view, the company came across several barriers when defining the R&D strategy, for instance the definition of the concept itself, a lack of specific formation within the company and a lack of knowledge and appreciation of the results on the part of the final customers of the service, as well as the scarce diffusion of the innovation efforts throughout the company.

On the other hand, with regard to participation in European R&D programmes, Metro de Madrid has encountered several difficulties, for example: information about programmes of this scope is not easily accessible, there is no clear procedure regarding access to R&D community programmes in services, and the feeling of being abandoned by the administrative bodies.

10. Policy issues

The main proposals for improvement hinge on two essential aspects: to make information to the companies more accessible, and the creation of an R&D European Forum by those sectors that bring together the different investigation routes and strengthen the element of collaboration in this respect.

Network Research

1. Introduction

Network Research (NR) is a medium-sized 'full service' Market Research agency based in London. Activities include telephone interviewing, multi-method customer satisfaction surveying, data interpretation, information packaging and research consultancy.

2. Conceptualisation of innovation and R&D

The terms 'R&D' and 'innovation' are almost never used to describe the development activity that takes place within NR (despite their potential applicability to the company's work on software development and process and service enhancement). The terms that might be used within NR to describe innovation include 'business development', 'service improvement' and 'new service development'.

3. Why engaged in R&D&I

Innovation is perceived to be central to success in a crowded and increasingly competitive environment ('differentiation' strategies are an important spur for innovation). Other drivers include: industrial trends (the arrival of new entrants); technological developments (ICTs have opened-up opportunities for new products and delivery mechanisms); and, policy developments (tightening of privacy laws has stimulated a search for 'work-around' solutions).

4. Organisational arrangements

Whilst the company does not have an R&D or innovation division, an active Business Development Group (BDG) is in existence. The BDG is tasked with (a) generating (or harvesting) ideas for innovation, (b) establishing innovative projects, and (c) managing the progress of innovation-linked activities. The BDG is constituted by individuals from across the broad sweep of NR's activities (each devoting a proportion of their time) and reports to the company's Board on a monthly basis. Directors in the company are described as 'hands-on' and each is expected to take some responsibility for the generation of ideas for product and service development. Some more 'formalised' R&D is evident in the development of bespoke software. NR employs one full-time 'in house' developer and contracts the services of a second software engineer.

5. Decision-making on R&D activities

NR clearly takes R&D and innovation seriously: its directors devote considerable energy, thought and resource to the development of new and improved service offerings. Innovation is a deliberate act with dedicated management and support (rather than ad hoc or an emergent or accidental function of day-to-day activities). Routine decision making with respect to innovation activities is handled by the BDG and project teams (although directors have an important role in overseeing progress). Investment in development is controlled tightly (NR does not have massive resource to devote to innovation) and the BDG is always required to mount a detailed business case prior to embarkation on innovation-linked projects.

6. Formalisation and R&D&I management

Whilst NR does not operate with a codified innovation strategy, innovation activity has been formalised to a degree via the inception of the BDG. The presence of an in-house software developer (and use of the services of a second engineer) is further evidence of formalisation In addition, the company has an implicit principle-set that guides innovation activity, viz. innovation should be driven by market needs, organised and focused [rather than ad hoc], founded upon optimal use of limited resources, and based upon 'open sourcing' of ideas.

7. R&D cooperation

Collaboration for innovation is uncommon in the Market Research industry – the competitive nature of the environment implies that potential advantage can easily be lost. Whilst HEIs are perceived primarily as a source of skilled labour, NR has adopted some of the research methodologies that have been developed and are deployed in the academic sector. Professional networks and associations are perceived as a source of ideas for innovative products and processes but not as a source of innovation partners.

8. Participation in publicly-funded R&D programmes

The company has not been involved in publicly-funded R&D initiatives – these are largely invisible to its directors and their possible relevance is has not been made clear. The company is small and focused primarily upon serving clients needs (there is little opportunity to research avenues for innovation support). NR tends to rely upon the creative talents and experience of its staff for ideas for innovation

9. Barriers to R&D and innovation

Barriers to innovation include: lack of resources to support the desired level of development work, weakness of existing protection mechanisms for service-focused innovations, and client conservatism and wariness (the served-market displays some contentment with familiar providers and tried and tested products).

10. Policy issues

Policies relating to privacy and data protection have impacted the MR sector significantly. Whilst there is some room for 'workaround' (and workaround is a driver for innovation), privacy legislation has implied a hardening in the operating environment for MR agencies. The opening-up of markets for services is starting to bite in the European MR industry and new entrants are entering the market space aggressively and in large numbers.

New Product Design and Development Consultants

1. Introduction

Micro businesses engaged in product design and development, usually in close collaboration with their clients – KIBS firms.

2. Conceptualisation of Innovation and R&D

The firms saw innovation as creative work that could include applying established technologies into new contexts – e.g., the use of plastics in mining machinery. As design and development consultancies their work is 'routinely innovative', although not at the cutting edge of technology, and some projects are much more innovative than others. The two firms (as opposed to the sole-trader) interviewed perceived that they undertook 'experimental development', mainly in response to clients' needs.

3. Why engaged in R&D&I?

Engaging in product design and development is what these firms do. However, the extent to which they engage in R&D (and 'experimental development' in particular) is essentially determined by their clients' needs – some clients only want restyling work, whilst others want more fundamental design and development. The firms engage in various types of work to remain in business, but seek to engage in more fundamental design and development because it is more interesting / stimulating / rewarding. Overall, their strategies are responsive, although to develop a market niche they have also sought to introduce new services (particularly rapid prototyping) which complement their traditional design skills. Overall, the ambition is to grow slowly, with an emphasis on responding to customer needs rather than through an internally developed R&D strategy.

4. Organisational arrangements

The interviewed firms are very small, single site, and are entirely focused on design and development – so there is no separate R&D department. The two firms had 4 and 6 employees respectively. They were growing, but very slowly (recruitment of designers was perceived as a significant barrier to growth, due to skill gaps and the time and cost of training). The R&D(&I) undertaken is oriented to the open model of innovation, with high levels of co-operation, particularly with clients, but also with manufacturers and other partners (such as electronics specialists), as appropriate to the needs of the project.

5. Decision-making on R&D activities

The activities undertaken are essentially determined by clients needs, although to some extent the firms have diversified (e.g., into rapid prototyping) to develop a particular market niche.

6.Formalization and R&D&I management

Design and development projects follow a four or five stage model, although this is customized to meet individual client's needs. The technologies used have changed dramatically in the last ten years – e.g., towards rapid prototyping, CAD and other electronic design technologies. This has encouraged some speeding up of the design process, and made design and development more open and less geographically constrained (e.g., detailed CAD designs can be sent around the world by internet to both clients and manufacturers).

7. R&D cooperation?

There is a great deal of co-operation with clients, but relatively little with suppliers (other than manufacturers) or universities. Some interaction with clients is with marketing departments, other interaction is with engineering / R&D departments. A considerable proportion of the workload is with repeat clients – i.e., relationships. Some is undertaken not to develop products intended for commercial introduction but for concept testing. Overall, relations with universities are for access to specialist equipment and/or high quality students. These companies are at the forefront of developments towards more open forms of R&D and innovation – i.e., innovation through networks rather than within individual firms.

8. Participation in publicly funded R&D programmes?

These firms have not directly participated in publicly funded R&D programmes – although their clients may have (details were not known to the firms) and so the firms may be indirect beneficiaries (although overall this is unlikely). The main reasons for non-participation appear to be a lack of awareness of particular schemes that might be appropriate, a feeling that what they do might not quality as R&D, and a perception that participation in schemes is bureaucratic. In other words, the firms perceived that there was support available, but many different schemes with many different criteria, making it confusing, time consuming and frustrating to find appropriate schemes.

9. Barriers to R&D and innovation?

The main influence on R&D and innovation is the firm's clients, so the extent to which clients seek innovation essentially determines what is undertaken. There was some difference in views as to whether and how the decline of manufacturing in the UK had impacted on the demand for design and development services. Interestingly, none of the firms interviewed had engaged in service design and development. In general, they thought their skills could be applied to service design and development, but their client base was product based firms – this perhaps suggests service firms do not perceive design and development consultancies as being relevant to their needs. A major barrier to growth was the perceived poor quality of the skills of design graduates in the UK – often these lacked basic business knowledge to complement their design skills. The expense in time and money of training new recruits was a significant barrier for these firms which are usually extremely busy undertaking day-to-day activities. Keeping up with technological change was also recognized as an important challenge, but also an opportunity.

10. Policy issues

As mentioned earlier, there was some feeling that support for design had declined and/or become much more bureaucratic than in the past. Many schemes are available (not just innovation / R&D related) but they have complex criteria – the firms have little time to search for the available support. They tend to gain support by 'accidentally' meeting the right people. R&D tax credits were perceived as not being relevant for two reasons – first they apply a very narrow concept of technological R&D which makes much of what the firms do ineligible, second the R&D undertaken is done under contract for clients, who may themselves apply for the tax credits – it is not for these businesses to make the claim. As such, any R&D claimed will be attributed to the clients (usually product companies) as oppose to these small service firms.

Norisbank

1. Introduction

The norisbank has about 1,150 employees. The headquarters are located in Nuremberg and there are 99 additional branch banks all over Germany. Since 2003, the norisbank AG is a company of the DZ BANK Group, which is one of the major private financial service providers in Germany.

2. Conceptualisation of Innovation and R&D

The norisbank has a clear understanding of R&D. It focuses on the development of new banking products. R&D expenses appear in the category of "Project business" in the balance sheet.

3. Why engaged in R&D&I?

Differentiation from competitors and the creation of a multifaceted range of products offering high margins are considered the main reasons for focusing on R&D at the norisbank.

4. Organisational arrangements

The norisbank allocates a standard amount of up to 10 % of the annual profit to be invested into the development of new products.
The product management department is essentially responsible for the realisation of R&D projects. Although there is also a separate team for product development, all product managers are involved in R&D projects. Furthermore, research & development is characterised by the interaction of several departments. These include in particular the marketing, sales, IT, risk management, controlling, production, legal and data security departments.

It should also be mentioned that the numerous product innovations are supported by a corporate culture that is conducive to innovation. The cornerstones of this are an unambiguous commitment to innovation on the part of the management board and the executives, a clear vision of the company's goals and a "fun-and-performance" culture within the company.

5. Decision-making on R&D activities

Decisions are predominantly taken by the head of marketing (who is also responsible for the product management department) or, in the case of major projects, by the board of management.

6. Formalization and R&D&I management

Within the norisbank, a formal process for product development has been defined. The most important process steps include framing of ideas, working out a business case (involves definition of target customers, legal analysis, etc.), developing a concept, testing, market launch with the participation of marketing partners (possibly for selected pilot markets at first) and evaluation.

7. R&D cooperation?

Some important external partners in the development process are the sales and marketing partners (especially the “Volks- und Raiffeisenbank” banks), market researchers, lawyers, technical specialists, consultants, universities and intermediary organisations. The intention is to have a diversity of cooperation partners in order to maintain and cultivate an openness to different views. In particular, it is important to have cooperation partners out of the financial sector.

Close contacts exist with some universities. All in all, however, the collaboration with research organisations is characterised as “moderate”. There are complaints about too much distance from practice in some instances and also about a lack of innovative drive.

8. Participation in publicly funded R&D programmes?

The norisbank is currently not involved in government-funded project. Some of the reasons given are a lack of information (i.e. the corresponding programmes and the opportunities they offer are unknown) and a lack of institutionalisation within the norisbank (i.e. there is no defined internal coordinator for research promotion and there are no systematic lobbying activities).

9. Barriers to R&D and innovation?

Some of the barriers mentioned for R&D activities include bottlenecks of resources (budgets, capacities) and the complexity of many development projects.

10. Policy issues

From the point of view of the norisbank, particularly a more intensive fundamental debate about future changes in the banking market is desirable. This includes in the first place questions about consumer behaviour, internationalisation, standards and technological options (e.g. digital signatures, cashless payments and cash point networks). Moreover, it is suggested to intensify the intersectoral exchange between service enterprises.

OCÉ N.V.[83]

1. Introduction

Océ N.V. (revenues of € 2,677 billion in 2005, headquartered in Venlo, the Netherlands) has over the years developed into a major manufacturer and provider of digital document management technology and services. Although predominantly known as a manufacturing firm Océ has over the years added a large variety of services to its portfolio.

2. Conceptualisation of Innovation and R&D

R&D is mostly associated with technological R&D. Descriptions of the R&D efforts at Océ are typically about the development of its technology portfolio, its strategic materials (toners, photoconductors, process drums and silicone materials), the development strategy for its new machines and the embedded software and application software developed at Océ. However, various types of enabling services (ranging from maintenance, financial services, business services, software, wholesale and retailing services and professional services) – part of which are more internally focused – involve considerable R&D. These efforts are quite often more concealed. Additionally, Océ has developed more and more client-specific services. Especially in the business services departments of a few of national operating companies, dedicated business developers together with their colleagues (both colleagues operating client sites as well as colleagues at Océ itself) are discussing how to develop new services and are planning to deliberately work on an up-to-date service portfolio. People involved in developing these new service elements and concepts have a very hands-on mentality and practical way of thinking about service development. Most of these practitioners will not perceive themselves as performing services R&D. More in general it is hard to assess where R&D in the development of e.g. application software stops and more regular software services start, for instance when developing a 'solution' for a client using existing, already developed components.

3. Why engaged in R&D&I?

Oce increasingly is engaged in services R&D as Océ's turnover and profits are to a major extent dependent on services. It is increasingly acknowledged that future competitiveness is more and more dependent on the possibility to customise products and services to client needs ('solutions'). Further the trend of clients striving towards reducing the cost of ownership, document process outsourcing and hence, for Océ, a more service-based business model leads to more attention for new service concepts and increasingly so services R&D.

[83] This case study mostly refers to the Dutch situation. It is known that e.g. German subsidiaries Océ Printing Systems GmbH (Poing/Munich) and Océ Document Technologies GmbH (Constance) have formalised service engineering capabilities and participated for example in at least three research projects funded by the German Ministry of Education and Research development of new services.

4. Organisational arrangements

In 2005 a total of 1800 persons (8% of the total workforce) were involved in corporate R&D (including approximately 500 software specialists). Services are not prominen in descriptions of R&D efforts at Océ. Océ is still to a large extent known, organized and managed as a product-led manufacturing company with a centralised R&D function. However, services R&D has been performed in various (hidden) forms for quite some time and is more widespread than visible from the outside: co-developing services for a new machine (manuals, tooling, user interfaces, maintenance services, etc.), the development of application software to support product sales, and developing new services in the various decentralised Océ operating companies. Starting in 2005, the nucleus of what may develop into a dedicated services R&D capability (within corporate R&D) has been generated by creating a pool of dedicated services researchers and developers.

5. Decision-making on R&D activities

In fact decision-making on services R&D takes place both at corporate and more decentral levels. Corporate R&D at Océ in fact consists of a relatively small Research department (intelligence function or outlook post), a corporate Development department and a corporate Engineering department. The researchers and developers operate in centrally managed multidisciplinary project groups. The corporate R&D function is managed using R&D management techniques that are quite common to R&D intensive manufacturing firms of this size. Part of corporate R&D activities has a services component and functions under the corporate R&D regime (way of working, decision-making). However, an explicit services R&D strategy is still absent. At the local level the (national) operating companies have quite some freedom to manoeuvre. Here national management in consultation with key employees in divisions such as business services decides on client-oriented service development and what projects to invest in through forms of portfolio management.

6. Formalization and R&D&I management

Until recently in R&D nobody was formally working on services R&D, but in practice development and engineering departments are working on services development surrounding the launching of a new machine and related to product maintenance. An estimated 15% of the total (technological) R&D capacity is used for developing these types of services (i.e. almost 200 FTE). It is only recently that services R&D is paid attention to more explicitly and starts to get a more formal status. This is reflected in the importance being mentioned in the annual report and - as indicated under 4 - the creation of a pool of dedicated services researchers and developers.

7. R&D cooperation?

For services R&D and innovation cooperation the focus is generally on major clients (offering new service concepts) and other specialised businesses. Océ flagged the need to cooperate and learn more from real-life experiments with clients and from other capital goods-producing businesses that have moved into services. Since specialist centres and studies seem to be mostly absent it is apparently difficult to identify relevant knowledge on service (innovation) in universities and research organisations.

8. Participation in publicly funded R&D programmes?

In services R&D and innovation Océ does not participate in current (manufacturing-focused) R&D and innovation programmes.

9. Barriers to R&D and innovation?

The shift from manufacturing-based business model towards a (much more) customised services business model has the character of a paradigmatic shift. One of the key challenges is how to ensure that the central and the distributed approach to services R&D and innovation can benefit more from each other. The success of the recent services R&D initiative will to a large degree depend upon:

- the ways in which the activities of the pool of service researcher and developers are linked into the innovation practice taking place in the national operating companies (i.e. decentralised client-led innovation),
- how the most promising service concepts are selected and turned into 'productised' services while they are diffused within the wider Océ organization, and thus;
- the support from senior management to proceed investing in services R&D and develop a focused services strategy

10. Policy issues

Policy suggestions put forward include increasing the aspect of sensitivity towards services and service innovation among knowledge workers; the creation of a platform of service innovation practitioners; increasing the role of social sciences and cognitive sciences in facilitating service innovations and developing new service designs.

Rabobank

1. Introduction

Rabobank Group, founded as a cooperative of Dutch agricultural banks, is owned by about 269 member banks, and focuses next to private banking, on the food and agribusiness industry. The cooperative's global investment banking arm, Rabobank International, has about 140 branches in more than 38 countries. The central organization advises local banks, but this advice is not binding. Rabobank offers a wide range of financial products, with high added value for low costs. Rabobank divides products into non-complex (now about 25 different products) and complex (at least 125) products.

2. Conceptualisation of innovation and R&D

We distinguish three types of innovation and R&D within the Rabobank: process innovation; self service concepts and channel management. Due to the important role of information and communication technology a central role is played by the ICT group of the Rabobank. The ICT group had a leading role in translating new technical opportunities in new ways of supporting the core processes and customer contacts.

3. Why engaged in R&D&I

Rabobank functions in a competitive market in which it competes with other major banks, and insurance companies, in the Netherlands. Although the market in itself competitive, there aren't many opportunities for growth in the local Dutch market. Cost reduction, efficiency and redesign of business processes and process management are of utmost importance for financial service providers.

4. Organisational arrangements

Services R&D can be found in multiple places within the Rabobank organization. Basically innovations are being pushed by actors who are conceptualized in social network analysis as cosmopolites. New service concepts, that are more commercial in nature, are in many cases generated by local Rabobanks and than scaled to other or to the national markets. The federative structure of the Rabobank and the Rabobank group enables a model in which innovation is valued, and longer investment cycles makes it possible to define projects with a longer time horizon.

5. Decision-making on R&D activities

Proposal for innovative hard or soft R&D projects are judged as any other project. But the Board of Executives of Rabobank keeps a distance, which make it possible for employees to work on innovative projects that are not under direct control of the Board. In most projects half of the funding is provide by the innovation team within ICT group, half by marketing, local banks or interested business unit. An important criterion is fit with the core strategy of the Rabobank, i.e. a focus on customer value. Technical conditions and the business case are important criteria as well.

6. Formalisation and R&D&I management

Rabobank has used scenario-analysis extensively as a helpful tool to build their innovation strategy. Based on these scenarios, and in combination with real option thinking, Rabobank tried to develop robust policy plans. Dynamic marketing and flexibility, timing and alignment are important to respond to the possible scenarios. However, the whole scenario approach didn't get a follow up, and was temporary a nice project in the context of strategy formulation by the Rabobank.

7. R&D cooperation

Rabobank cooperates with a number of parties, mainly technology providers, in service innovation. Technology providers, more than universities, are able to provide the Rabobank with practical solutions and applications. The Rabobank sees its own role not solely as investor in knowledge intensive projects, but wants to share its knowledge with its customers and government. Only in a limited number of cases clients are involve in service innovations at Rabobank. Collaboration with market parties are more likely a driver and enabler of service innovation. On a local level Rabobank initiate studies together with local municipalities on local economic developments. Contact with universities or collaboration has an ad hoc nature and is not part of official policies of the Rabobank group. There are some part time positions created at universities and funded by the Rabobank. However there isn't a clear focus on service innovation.

8. Participation in publicly-funded R&D programmes

Rabobank has been involved in one of the virtual research institute funded by the Dutch Government in 1997, i.e. the Telematica Institute. But the Rabobank orientation is more on proven technologies and the direct applicability of technologies. Furthermore the pre-competitive nature of research projects makes them rather cumbersome and not directly applicable.

The Rabobank did apply for subsidization of projects by the European Union, but in general the response was that proposed projects were too small for a large enterprise as the Rabobank. Rabobank participate in a number of projects that are directed to sustainability. To conclude, the Rabobank or subsidiaries of the Rabobank sometimes participate in research programs, but most of the time this is on the level of program committees or steering groups.

9. Barriers to R&D and innovation

Barriers that are mentioned by interviewees are the limited sharing of knowledge, best practices and worst cases, as well as the expertise within the Rabobank organization. Knowledge management with regard to (service) innovation is not very well organized. Sometimes promising projects are not supported by necessary funds, mainly motivated by the fear of cannibalization of existing services or service channels, or the fact that other regular projects require the scarce resources.

10. Policy issues

The Rabobank has a clear vision on what is expected from the national government with regard to innovation in general, and service innovation specifically. Their recommendations are rather general in nature and discuss elimination of bottlenecks in the (physical) infrastructure, less emphasis on wage restraints, simplification of subsidization programs, stimulation of entrepreneurship (and intrapreneurship) both by changing the opinion climate and tax exemptions. More specifically the Rabobank is concerned about cumbersome procedures for patent applications and restrictions for foreign students and knowledge workers. There is a strong sentiment that bureaucratic and cumbersome procedures regarding government innovation programs are counterproductive. This is an argument not to apply for subsidization.

Randstad Group staffing and HR services

1. Introduction

Dutch-based Randstad Group (€ 6,638.5 million in revenues in 2005) is one of the largest staffing and human resources service organisations worldwide. Its key asset competence is its deep knowledge of work and work-related processes and detailed understanding of the demand for and supply of labour. In addition to offering traditional mass customised staffing services, Randstad has deliberately moved towards higher value-added services (or 'specialities') for which new service concepts and business models are being developed. As such, Randstad is increasingly developing into a Knowledge Intensive Business Service (KIBS) firm.

2. Conceptualisation of Innovation and R&D

Randstad is much more likely to think in terms of business development than innovation or R&D. But although services R&D and innovation is therefore largely hidden, innovation and new services are important to Randstad and embedded in various activities ranging from optimising large scale administrative processes, business concept development, co-innovating with major clients and creating an open corporate culture in which 'bottom up' innovations are valued and where needed adopted by senior management for further diffusion. In practice, innovation in an organisation like Randstad means enriching, blending and customising the company's basic activities into well-defined, profitable and strong service concepts that can be rolled out swiftly.

3. Why does Randstadt engage in R&D and Innovation?

Innovation is something of a bonus activity for Randstad, as mass-customised services still have considerable growth potential. Nevertheless, as the clear market leader Randstad aims to be an innovative player which increases value added through developing more specialized services, for which it is actively developing new service concepts. Other drivers include the knowledge component of the services offered (e.g. more organisation talent, more marketing) and the potential for efficiency savings and quality enhancement of the (still) massive administrative processes that underlie the mass customised services. Finally, changes to labour market regulations require that the company adapt to these, and this influences the development and introduction of new services and service concepts.

4. Organisational arrangements

Randstad does not have a traditional R&D lab, nor an R&D function, nor an R&D budget or strategy, and is unfamiliar with phrases like 'services R&D'. Services R&D and innovation are however embedded in various activities and are therefore best described as a scattered activity within Randstad. On the one hand Randstad has adopted a 'bottom up' approach to innovation and challenges all key employees to step forward with ideas for incremental innovations and new service concepts. On the other hand there are at least two groups within the company holding a special responsibility for innovation. These are Strategic International Accounts group and the Business Concept Development group. The first in fact co-innovates with major clients, the second plays a key role in identifying, describing and diffusing best practices within the Randstad organization, particularly through the company's 'copy & paste' strategy. Both groups are of a limited size. However, if the need for a new service is detected, an international project team will be assembled to work on a dedicated solution. Randstad has a considerable number of business and process consultants from different backgrounds who are able to contribute towards solving this type of problem and develop new service solutions that may in the future form the basis of more generally available service products.

5. Decision-making on R&D activities

Activities undertaken are essentially determined by client needs as these are recognised by Randstad consultants working close to the market or the dedicated units dealing with innovation and process optimalization. Portfolio management allows top management to monitor and decide on a portfolio of 10-20 innovation projects in Randstad worldwide. One member of the executive board of directors has responsibility for innovation.

6. Formalization and R&D&I management

Randstad Group uses the well-known funnel concept in combination with portfolio management to organise its new service development (or 'R&D and innovation') process. The type of project may range from incremental development through completely new service offerings to innovations in the back office. The so-called 'copy & paste' strategy is used to select, describe in detail and, if appropriate, replicate new service concepts internationally. This helps Randstad to swiftly roll out new, strong service concepts into new markets. The development part is well structured and there is a trend towards more systematically organising the pure intelligence function (i.e., the 'research' side of R&D).

7. R&D cooperation?

By deliberately including major international clients Randstad involves 'lead users' in the development of new services (i.e., it engages in co-innovation). Randstad also cooperates with other businesses on a regular basis when introducing new services or making propositions for which inadequate knowledge is available in-house. Although there are several examples of how Randstad links up to academia, R&D co-operation with Higher Education Institutes and RTOs (other than as sources for Randstad talent) is the exception rather than the rule. Professional organisations such as Randstad benefit from an open innovation culture in service enterprises.

8. Participation in publicly funded R&D programmes?

Randstad is not a regular user of R&D and innovation programmes. There are a few ad hoc examples of R&D or innovation support through government e.g. when developing innovative ICT applications. However, participation in these programmes is not systematic or centrally managed.

9. Barriers to R&D and innovation?

The actual services offered and the opportunity to offer innovative services is to a large degree dependent on how national labour markets are regulated. Other barriers include the timing of introduction (in terms of users' demand for new concepts) and the availability of management capacity. Fundamentally, all Randstad employees are obliged to actively monitor and recognise business opportunities, and possibilities to improve and innovate the services offered. This requires a management style that is aimed at empowering the shop floor. It is key given that to a large extent this defines the input of good ideas that enter the 'innovation funnel'.

10. Policy issues

Apart from the fact that a firm like Randstad is very dependent on how labour markets are regulated it was emphasised that government could contribute to creating a more favourable open innovation culture in general, and in service enterprises in particular. Furthermore, given that Randstad is developing into a knowledge intensive business service (KIBS) firm, it is in need of professionals who have received education and training in consultancy skills, in project-based co-operation, and in knowledge sharing in learning organisations. This evidently has implications for education and training policies.

Roke Manor Research

1. Introduction

Founded in 1956 the company is now owned by Siemens, but remains an autonomous operation. Roke Manor employed 404 people in 2004, of which 330 are professional engineers and scientists, at its base in Romsey in Hampshire in the UK. Of its current personnel, approximately 85% are employed in research and development. Its own R&D expenditure was € 3.1 million with a turnover of some € 43.9 million.

2. Conceptualisation of innovation and R&D

The development of new services is commonly perceived as either 'product development' or 'customer-focused innovation' rather than as R&D per se. Significant organisational innovation has been experienced throughout the company over the last five years and more is expected as the company positions itself to serve rapidly evolving needs of its key sectors, most notably defence and electronics sectors. Process and organisational innovations have been launched primarily in a bid to introduce greater efficiency into tasks and activities and many are supported by developments in, or new applications of, technology.

3. Why engaged in R&D&I

Investment in science and technology is key to pioneering innovation; Roke Manor Research has a policy of increasing technological investment to maintain its leading position in electronic sensors, communications and information systems. As global competition continues to grow, Roke Manor Research has maintained its competitive advantage by being increasingly innovative and using its diversity and breadth of knowledge to provide its customers with many new services to ensure they stay leaders in their markets.

4. Organisational arrangements

Currently Roke Manor Research Limited is located on just one site in Romsey, Hampshire, some 5 kilometres north west of Southampton. It is kept organisationally separate and autonomous from its parent company, Siemens, although it does bid for, and undertake, R&D work for other parts of Siemens. RMR has substantially reorganised itself around major divisions and has clear growth targets for each. This in contrast to its earlier more chaotic R&D organisation centred around much smaller, self defining project teams. The company is moving to a much firmer, commercial basis centred around new growth opportunities in research.

5. Decision-making on R&D activities

There has been a shift from decision-making on R&D activities away from small research teams towards a much more structured and market orientation approach based on larger (market-based) divisions (see above). These divisions have clear growth targets which are supported by the central management team.

6. Formalisation and R&D&I management

Responsibility for R&D is broadly devolved to the level of departmental directors and much of Roke Manor Research's activity is focused on three main divisions: 1) 'Waves' (wireless) division; 2) 'Packets' (software and networking) division (for customers such as BT and Cable & Wireless) division; and 3) Systems division.

7. R&D cooperation

A large proportion of the R&D undertaken by Roke Manor Research involves close collaboration with its clients. Co-innovation is very common in this mode of operation, whilst clients increasingly require complete solutions to their problems. Thus, customers often require total business solutions as well as niche products, one of the changes has been to develop a systems engineering capability to provide an end-to-end service. Roke Manor Research is seeking to offer customers a continuous capability, from requirements capture and business planning through to delivery of their product, technology or service. In addition to working closely on specific innovation projects on a one-to-one basis with single clients, Roke Manor Research (as with many other types of KIBS firms) also acts as innovation intermediary with a wider set of firms and organisations (including government departments).

8. Participation in publicly-funded R&D programmes

Yes, mainly through Ministry of Defence programmes in the UK, but also through EU Framework programmes. Overall access to these schemes is good and not seems as being restrictive for an organisation like Roke Manor Research.

9. Barriers to R&D and innovation

Recruitment of skilled scientists and engineers, a major problem, especially of UK nationals as some defence related work requires British citizens only to work on certain projects.

10. Policy issues

Only indirectly through increased regulation requiring more testing and analytical work which in turn will mean more demand for RMR's services.

Siemens Medical Solutions

1. Introduction

Siemenns Medical Solutions has about 31,500 employees worldwide. In the field of services 5,200 persons are employed. The annual turnover for services worldwide is estimated at about 1.5 billion euros.

Its portfolio enhances product bundles with complex products, integrated technologies and supporting services for the high level of quality in the health care sector. Such a high level permanently requires new products and services to meet customer needs. Siemens Medical Solutions was one of the first manufacturing companies that already introduced a new service development process in the early 1980s. Since then, it has developed a whole range of new, innovative services and the service department has become a highly profitable part of the company.

2. Conceptualisation of Innovation and R&D

Siemens Medical Solutions offers services that are strongly linked to their core products (e.g. computed tomography, ultrasound devices, x-ray devices). The company has its own R&D department, but no clear distinction is made between the R&D of products, IT or services.

3. Why engaged in R&D&I?

The main reason for being active in R&D for services is that services can be used to differentiate from other providers, because innovation of products provides just a short term success and will be obtained by competitors. In particular, high-quality services offer a possibility to establish long term customer retention.

4. Organisational arrangements

There is no explicit data about the expenditure on R&D for services either at Siemens Medical Solutions. But it is estimated by one interview partner that about 50 percent of the R&D employees of Siemens Medical Solutions in the German headquarters are working on service-related topics

Besides the general R&D department, most of R&D activities for services are arranged by the department “Services Marketing / Business Development”. It identifies new services, initiates new service development and enhance productive services. The department has seventeen employees, five of them with a PhD. The skills of the staff “Service Marketing / Business Development” are very different.

5. Decision-making on R&D activities

R&D activities for services are focused on the headquarters in Erlangen (Germany). In most cases, the initiator for new services is the department “Services Marketing / Business Development” that has intensive contacts to customers, partners and the Siemens sales force. New service concepts are realised together with the traditional R&D department.

6. Formalization and R&D&I management

The development of services is supported by a “service roadmap” and a “service engineering process”.

7.R&D cooperation?

Siemens Medical Solutions has established an own innovation network, the so-called "Siemens Medical Solutions Innovation Network". Most of the participants are clients and suppliers. Concerning their service activities, the co-operation with universities doesn't play an important role, because the necessary combination of technological and service know-how is hardly a topic at German university chairs.

8. Participation in publicly funded R&D programmes?

In the field of pure services, Siemens Medical Solutions is currently not participating in any R&D programme in Germany and in Europe.

9. Barriers to R&D and innovation?

Main barriers encountered in formulating the strategy and performing R&D for services in relation to other activities in the company are:

- the corporate culture of a large company,
- differing interests of the involved departments ,
- the rejection of new services by other regions/countries,
- service is a cost centre and is allocated to business areas (therefore it is necessary to convince why service business is relevant),
- the priority of services in product development is not always high enough.

10. Policy issues

Within the case studies, the only mentioned policy suggestions were strongly related to the Health Care sector.

Telefónica I+D

1. Introduction

Telefónica I+D is a private company, established in March 1988. This company is dedicated exclusively to research and development and is the leader in the telecommunications sector in Spain. Its activities, of national and international character, are fundamentally concerned with the improvement of the competitiveness of the Telefónica Group by means of technological innovation. R&D activities have been closely linked to the evolution of telecommunications and the social demands in this field.

2. Conceptualisation

Telefónica I+D conceives innovation as one of the pillars on which its transformation is based and dedicates the efforts of its employees totally to technological innovation (products/services innovation, process innovation), marketing innovation and organisational innovation. In short, R&D is concentrated on new processes, new products and new technologies. Telefónica invested nearly 2,400 million euros in technological innovation, of which 461 million euros were assigned to specific R&D activities and the rest to innovation.

3. Why engaged in R&D&I?

In 2004, Telefónica I+D established a New Model of Innovation more in accordance with the strategy of the Group and is contemplating technological, commercial and operative processes innovation. It promotes the efficient transformation of ideas in new products, processes and services, constantly looking for competitive advantages and breaking into new markets. Being the telecommunications leader in Spain, Telefónica is searching for a strategic position in other international markets.

4. Organisational arrangements

Telefónica I+D constitutes a network of Centres of Excellence for research and development, and these are distributed geographically on the national and international level. In Telefónica I+D, there are 1,271 professionals dedicated exclusively to innovation, to which must be added the 491 people of the Units of Business of Telefónica who are also engaged in R&D activities. This human effort is complemented with the indirect employment generated by the 4,139 people who collaborate with specific R&D projects.

5. Decision-making on R&D activities

This is driven by the Corporate Committee of Innovation, which is formed by the maximum number of people in charge of the Group's main innovating organisations. The objective is to coordinate a Plan of Innovation and manage the Group's Portfolio of Technological Options. A new external advisory body, the Scientific Advisory Council, has been created in order to generate new ideas. This Council is made up of prominent individuals from the scientific and business communities.

6. Formalisation and R&D&I management

The Telefónica's Innovation Model systematises R&D&I corporate policies, management tools (such as the innovation website) for R&D projects and indicators of innovation (success, portfolio, follow-up and financial indicators). It has two main elements: the System of Management of the R&D&I of the Corporation, and the Innovation Plans of each Business Unit of the corporation.

7. R&D cooperation?

Telefonica I+D regards the element of cooperation as a cornerstone of its innovation process (it collaborates with 42 enterprises and 24 Universities). It also plans to strengthen its collaboration with other agents as the motor of the innovation process or as the main contributor of that process. The degree of Telefonica's participation with the different agents depends on the intensity of the resources and the timing.

8. Participation in publicly-funded R&D programmes?

During the period 2004-2008, Telefonica I+D participated in 71 projects promoted by the EU within the Framework Programmes

9. Barriers to R&D and innovation?

The main problem pointed out by Telefonica I+D is the existence of several 'official' definitions of R&D and technological innovation that complicates the process, as well as other steps in the participation of R&D public programmes, such as publication, justification or petition processes.

10. Policy issues

It is necessary to advance, both in the definition of public support programmes that boost private innovation and in the definition of an easier framework to accede to European R&D aids.

Annex 5: Overview RENESER reports

Statistical reports[84]

- Segers, J., Tether, B. and P. den Hertog (2006), Research and Development Needs of Business Related Service Firms:Statistical Evidence. Reneser working document, Dialogic/CRIC, Utrecht/Manchester
- Hertog, P. den & J. Segers (2005), Use of national R&D schemes by service firms. The Dutch evidence, RENESER working document, Dialogic, Utrecht.
- Tether, B. (2006), RENESER Stats from New Cordis Website, RENESER working document, PREST/CRIC, Manchester [includes figures on participation of service firms in public support schemes aimed at innovation in the UK] .
- Meiren, Th. (2006), Funded services Research in Germany, RENESER working document, Fraunhofer IAO, Stuttgart.
- Narbona, A. & Rubalcaba, L. (2006), R&D national programmes. Case Study: Spanish government, RENESER Working Document prepared for DG Internal Market and Services as part of the Framework Study on the Research and development Needs for Services (RENESER), University of Alcalá and Servilab, Madrid

Case study reports

- Dialogic/Fraunhofer IAO/PREST-CRIC-IoIR/Servilab-University of Alcala (2006), Evaluation of the R&D Needs of Business-Related Services Enterprises. Case Study Report, RENESER Working Document, Utrecht/Stuttgart/Manchester/Madrid.

Distributive trades

- Segers J. & P. den Hertog (2006) Case study: Services' R&D At Ahold - Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises), Dialogic: Utrecht/Zaandam, The Netherlands
- Meiren T. & I. Moerschel (2006) Case study: Metro - Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises), Fraunhofer IAO: Stuttgart/ Neuss, Germany
- Narbona A. & L. B.Rubalcaba (2006) Case study: El Corte Ingles. Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises), Servilab: Madrid, Spain.

Network services

- Meiren T. & I. Moerschel (2006) Case study: DB Dialog Telefonservice GmbH. - Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises), Fraunhofer IAO: Stuttgart/Berlin, Germany
- Narbona A. & L. B.Rubalcaba (2006) Case study: Metro de Madrid. Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises), Servilab: Madrid, Spain.
- Narbona A. & L. B.Rubalcaba (2006) Case study: Iberia. Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises), Servilab: Madrid, Spain.

[84] Including working documents on service firm participation in national R&D programmes.

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- Bouwman H. & J. Segers (2006) Case study: Services' R&D At Rabobank - Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises), Utrecht, The Netherlands
- Meiren T. & I. Moerschel (2006) Case study: Norisbank- Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises), Fraunhofer IAO: Stuttgart, Germany
- Narbona A. & L. B.Rubalcaba (2006) Case study: Banco Santander. Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises), Servilab: Madrid, Spain.

Knowledge Intensive Business Service (KIBS)

- Hertog P. den & J. Segers (2006) Case study: Services' R&D At Randstad - Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises), Dialogic: Utrecht/Amsterdam, The Netherlands
- Howells, J. & L. Green (2006) Case study: Fujitsu Services sector. Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises) – sector: t-KIBS/ICT Services and Solutions, PREST: Manchester, UK
- Howells, J. & L. Green (2006) Case study: Network Research (NR) Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises), PREST: Manchester, UK
- Green L. (2006) Case Study: Independent Television Facilities Centre (itfc). Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises) - Sector: t-KIBS/Broadcasting, PREST: Manchester/London, UK
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- Howells, J. & L. Green (2006) Case study: New Product Design and Development Consultants. Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises) – sector KIBS, PREST: Manchester, UK

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- Meiren T. & I. Moerschel (2006) Case study: DIN Deutsches Institut für Normung e.V. (DIN German Institute for Standardisation). - Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises), Fraunhofer IAO: Stuttgart/Berlin, Germany
- Meiren T. & I. Moerschel (2006) Case study: Fraunhofer-Gesellschaft - Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises), Fraunhofer IAO: Stuttgart, Germany
- Howells, J. & L. Green (2006) Case study: Roke Manor Research Limited. Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises), PREST: Manchester/Romsey, UK

Services' R&D in manufacturing firms

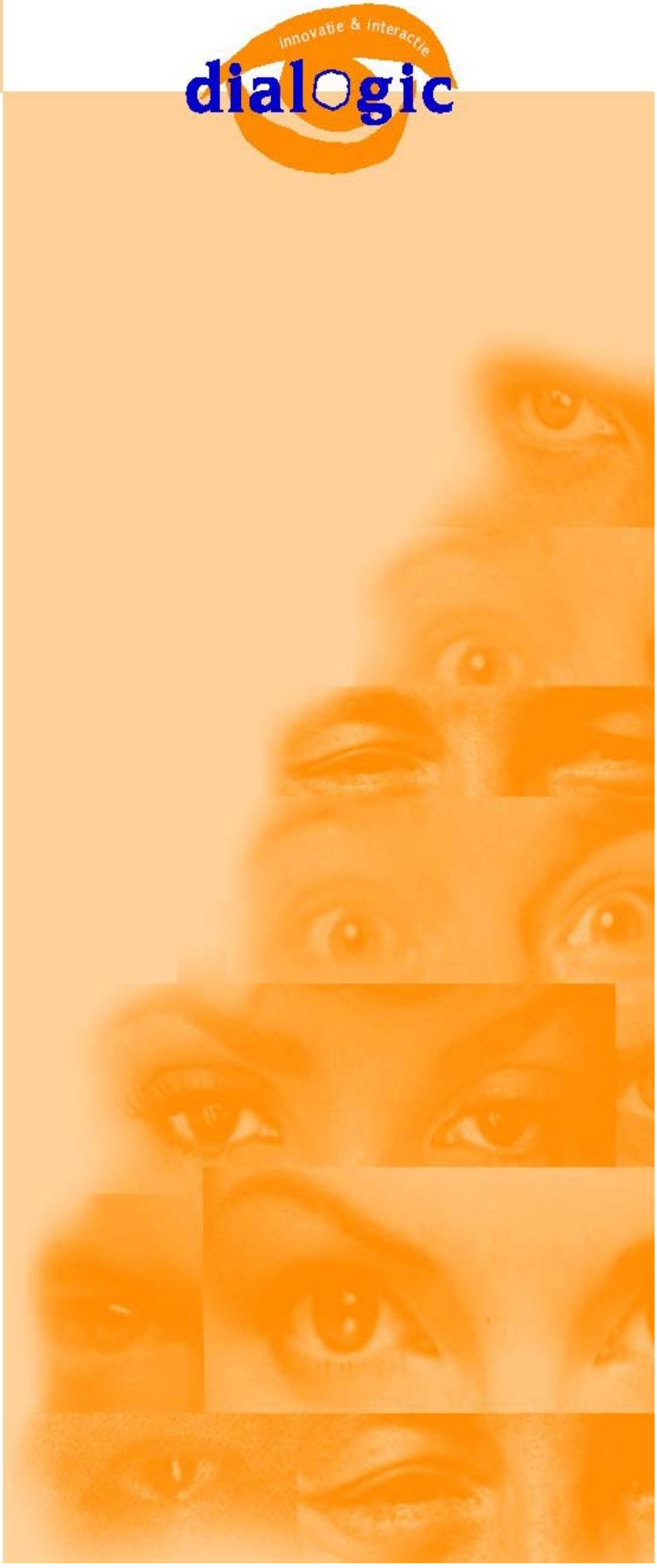
- Hertog P. den (2006) Services' R&D At Océ - Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises), Dialogic: Utrecht/Heerlen, The Netherlands
- Howells, J. & L. Green (2006) Case Study: Astra Zeneca – Aptium Oncology Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises, PREST: Manchester/Alderley Edge, UK
- Meiren T. & I. Moerschel (2006) Case - Siemens Medical Solutions. Case Study within the framework of RENESER (R&D Needs of Business-Related Service Enterprises), Fraunhofer IAO: Stuttgart/Erlangen, Germany

Topical papers

- Hertog, P. den & L. Rubalcaba (2006), Is there a rationale for services R&D and Innovation policies?, RENESER working document, Topical paper no. 1, Dialogic /Servilab, Utrecht/Madrid..
- Rubalcaba, L. & J. Gallego (2006), The participation of business-related services in public R&D programmes: Their particular role in EU FP, RENESER working document, Topical paper no. 2, University of Alcala and Servilab, Madrid.
- Meiren, T. (2006), Services' R&D as Performed by Manufacturing Firms, RENESER working document, Topical paper no.3, FhG-IAO, Stuttgart
- Howells, J. (2006), Role of R&D Services in Service Innovation, RENESER working document, Topical paper no.4, PREST/CRIC, Manchester.

Intermediate reports

- Dialogic/Fraunhofer IAO/PREST-CRIC-IoIR/Servilab-University of Alcala (2006) Framework report project R&D needs of business related services (RENESER), RENESER Working Document, Utrecht/Stuttgart/Manchester/Madrid
- Dialogic/Fraunhofer IAO/PREST-CRIC-IoIR/Servilab-University of Alcala (2006) Progress report project R&D needs of business related services (RENESER), RENESER Working Document, Utrecht/Stuttgart/Manchester/Madrid



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