

# **Conceptualising Service Innovation and Service Innovation Patterns**

**March, 1999**

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Thematic essay<sup>1</sup> within the framework of the Research Programme Strategic Information  
Provision on Innovation and Services (SIID) for the Ministry of Economic Affairs,  
Directorate for General Technology Policy.

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<sup>1</sup> This essay builds on earlier work in the European Commission sponsored 'SI4S' programme (Services Innovation, Innovation for Services), and in particular on the collaboration with Prof. Ian Miles in that programme (cf. Hauknes, 1998; Sundbo & Gallouj, 1998; and Bilderbeek, Den Hertog, Marklund & Miles, 1998).

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## 1. INTRODUCTION

The project “Structural Provision of Information on Innovation and Services” – in short SIID – was initiated in 1998 to improve the understanding of innovative activities in service industries<sup>2</sup>. SIID consists of three lines of research: developing a database on innovative activity in services (1); thematic essays on particular aspects of innovative activities in services (2); and, comparative policy studies on issues related to what might be labelled as ‘services innovation policy-making’ (3). The latter two are clearly linked to the construction of the SIID database. This database in practice consists of three separate databases:

- a macro-database containing macro-economic indicators of the six SIID service industries. Data mainly stem from well known statistical sources (OECD, CBS, etc.). This database will be linked to the ICOP database;
- a micro-database containing micro-economic indicators of the six SIID service industries. Data are derived from micro (-aggregated) data sets such as CIS I, CIS II;
- a sectoral database zooming in into partly industry-specific data and indicators available for the six SIID service industries.

In consultation with the principal and in parallel with the construction of the SIID database the first of the four phases within the SIID-project starts with two papers: a quantitative survey paper on innovation in services (1) and a more qualitative thematic paper on conceptualising innovative activities in services (2). The first paper (van Ark and de Jong, 1999) provides an overview of available data sources as well as some analytical structures to be used in the analysis of the quantitative information from the macro- and micro-databases<sup>3</sup>. The second paper (this paper) presents a simple conceptual framework – containing a four dimensional model – for characterising innovative activities in services (chapter 2) and a typology of service innovation patterns (chapter 3). This is partly complementary to the analytical structures present by van Ark and de Jong (1999), but it is specifically meant as an input in the construction of the SIID sectoral database, which aims to construct quantitative and qualitative sector-specific information for selected service sectors (chapter 4). Ultimately this paper aims at contributing to a better insight into the:

- dimensions that are relevant when discussing innovative activities in services;
- various roles individual service firms play in innovation activities in general;
- selection of indicators that can best measure innovation activities in selected service industries.

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<sup>2</sup> The basis for the SIID project was described in a feasibility study, see den Hertog et al. (1997).

<sup>3</sup> See Bart van Ark, Lourens Broersma and Gjalt de Jong (1999).

## **2. ANALYTICAL FRAMEWORK FOR SERVICES INNOVATION**

There is a wide range of different ways to consider innovative activities in services, among others differing in terms of:

- the kinds of knowledge on which they are based, e.g. ‘hard’, technological versus ‘soft’, organisational knowledge,
- the focus on a particular service (‘micro’) or – more generally – a certain category of services (‘macro’),
- whether an innovation is new to a particular firm, to an economic sector, or to a certain production process, etc.

In practice most innovations appear to be a mixture of major and minor changes and adaptations of existing (service) products forming together the innovation at hand. Considering that service innovations manifest themselves in rather different ways, it is self-evident that – in order to be able to discuss, map and analyse the diversity of innovations in greater detail and in a structured way – a simple analytical framework is needed. This paper is aimed at such a framework. Below, we will first briefly review a number of theoretical approaches to service innovation (section 2.1), then introduce the 4 dimensional model of service innovation and its underlying dimensions (sections 2.2), and the linkages between these dimensions (section 2.3).

### **2.1 Theoretical approaches to service innovation**

The service innovations literature abounds with a wide variety of definitions and approaches. The question “What does it mean to produce a service?” has been answered in many ways. We feel particularly attracted by the description of Gadrey c.s. (1995): “to produce a service [...] is to organise a solution to a problem (a treatment, an operation) which does not principally involve supplying a good. It is to place a bundle of capabilities and competences (human, technological, organisational) at the disposal of a client and to organise a solution, which may be given to varying degrees of precision”.

This definition makes it clear that apart from technological capabilities, human and organisational capabilities are also important for providing services. Additionally this definition allows for a differentiation between highly standardised service products or service formulas with quasi good characteristics (e.g. fast food chains) and the more customised services that are much harder to pinpoint. The latter category of services is often based on more tacit forms of knowledge; moreover, they often emerge as a result of co-production between the actual service provider and its client, as many consulting and advisory services show.

The analysis of services and services innovation has progressed quite remarkably the last decade. Although the attention given to services by researchers grew from the 1970s on, they were long discounted in terms of technological innovation. In 1984 Pavitt – introducing his sectoral taxonomy of technological change – labelled the services industries as mainly supplier-dominated sectors<sup>4</sup>. Similarly, the important theoretical contributions of Barras (1986, 1990) portray most service sectors as supplier-dominated, and as receiving an impetus from manufacturing in order to be able to embark on subsequent phases of innovation processes.

However, the field of services innovation studies has gradually expanded, with two results of significance here. First, it has been recognised that many services deliver a – sometimes substantial – contribution to innovation processes, they are not merely passive recipients of others' innovations. Second, the emphasis on technological innovation has been somewhat moderated by recognition of the importance of non-technological elements of, and approaches to, service innovation. This resulted in a better understanding of e.g. the peculiarities of services (Miles, 1993), service management (Norman, 1991; Quinn, 1992), the significance of interaction with clients (and of clients' competences; cf. also Kline & Rosenberg, 1986), the importance of recombination of existing elements in new services (Henderson & Clark, 1990; Foray, 1993) and other such points. More recently, Gallouj et al. (1997) discerned a total of six innovation models that could be used for describing services innovation. They distinguish between radical innovation, improvement innovation, incremental innovation, ad hoc innovation, re-combinative innovation and formalisation innovation.

A logical candidate for an comprehensive conceptual model on innovation in services, or a general innovation model that applies equally to services and other sectors, does not seem to exist yet. Distinguishing service and manufacturing functions increasingly is artificial. Service functions are spread all over the economy, and service innovations are relevant – although to different degrees – in all industries. The variety of available models for thinking about services innovation does help identify those dimensions which appear to be most relevant here.

Accordingly, we will describe below an (admittedly eclectic) conceptual model or heuristic tool that will enable us to discuss service innovation in general terms. It has proved useful in this respect in discussions with policy-makers and service entrepreneurs. Although conceptual, it is concrete enough to map service innovation and discuss the practical development of new services or service innovation policies.

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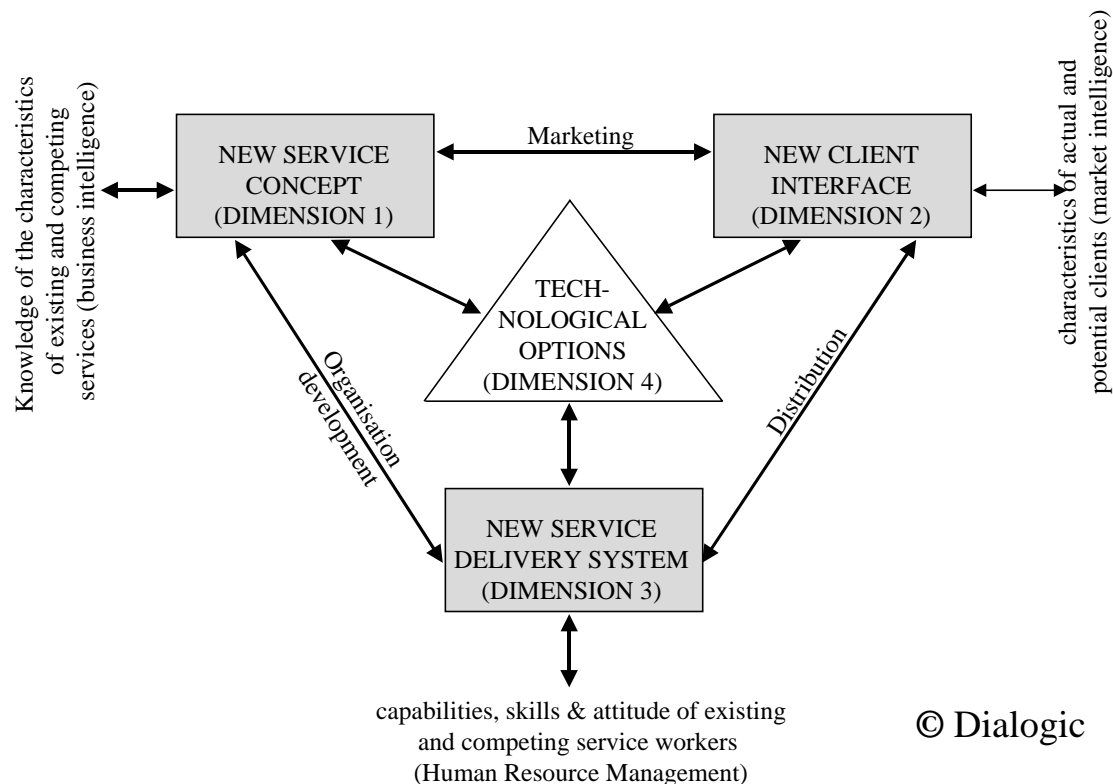
<sup>4</sup> Soete & Miozzo (1989) provided a more differentiated picture of the services industries distinguishing between supplier dominated, scale intensive physical networks and information networks and specialised/science

## 2.2 The four dimensional model of service innovation

Just like any product, *service* innovations are seldom limited to a change in the characteristics of the service product itself. Mostly, innovation coincides with new patterns of product distribution, client interaction, quality control and assurance, etc. However, service innovations show huge differences in the kinds of patterns: what is important for introducing one new product onto the market might be totally irrelevant for other products. Offering a completely new service may differ considerably from offering an existing service using a new distribution channel. Similarly, some innovations are mainly the result of co-production of an innovator and his client while others are clearly the result of applying a certain technology.

Below, we will present four dimensions which we believe are helpful in describing and analysing service innovations (see figure 1). This model is not statistically tested, but should be interpreted as tool to map and characterise various service innovations. The individual dimensions impact upon each other in both directions. Below we will present the four dimensions discerned, before touching upon the linkages between them in section 2.3.

Figure 1: A four dimensional model of service innovation



based services. Although this may be a helpful extension of the Pavitt taxonomy, it still remains a mostly technical (and sectoral) taxonomy.

### *Dimension 1: the service concept*

In manufacturing innovation, new products (and processes) are typically highly tangible and visible. This is often not the case with services. Some service innovations are highly visible, especially where delivery of the product is involved (ATMs, etc.). However, frequently it is not so much a physical product but a much more intangible characteristic of a new service, like a new idea or concept how to organise a solution to a problem. Although a particular service concept may already be familiar in other markets, the key thing is that it is novel in its application within a particular market. As usual in innovation research, there are thorny problems concerning when a product, function or concept is really new. Judgements can vary according to whether and when it is new to the providing firm, new to the client, to the regional, national or global market and whether it involves new logic or scientific knowledge. Although not all service innovations have such a strong conceptual element, conceptual innovations are much more likely to be found in service firms (or better service functions) than in pure manufacturing firms. Such innovations are usually highly intangible – meaning that while in some cases the service itself may have quite tangible elements, the new features are less to do with material artefacts, etc.

#### *Box 1. “Conceptual Innovations”: some examples*

- Call centre services – installing, organising and recruiting for their client’s call centre – have emerged from temporary staffing offices on the basis of their initial involvement with providing temporary labour for call services.
- IT consultants may offer semi-standardised and incremental plans for implementing e-commerce towards their client firms.
- Benetton has developed a particular style of shopping outlets in order to give the brand name its own character, to create a specific shopping environment that is recognisable for their clients.

### *Dimension 2: the client interface*

A second element of service innovations is the design of the interface between the service provider and its clients. These interfaces are the focus of a good deal of service innovations. Innovation studies with a focus on mass manufacturing usually tend to overlook in particular the changes occurring in these interfaces. Nonetheless, the communication between service suppliers and clients forms a major area for service innovation. As a quite general phenomenon across a wide span of services, product offerings are increasingly marketed and even produced in a client-specific way (even with client-specific pricing) and delivered electronically as far as they have informational components.

In business services in particular, clients are often also part and parcel of the production of the service product. The way the service provider interacts with the client can be a source of innovation. Increasingly there is no clearly identifiable point where the producer’s activity stops and the user’s activity begins. This is of course particularly true where the business service itself is offering support

for innovation, like e.g. in R&D and design services. With the high degree of co-design and co-production of service products, it may be difficult to locate the innovation within service supplier or client: it is not unusual, for instance, for service firms to site their staff within client organisations for periods of time.

*Box 2. "Client-Interface Innovations"*

- The large-scale introduction of account management systems in professional organisations such as economic consulting or IT firms can in some cases be interpreted as a renewal of the client interface.
- Electronic data interchange represents an effort to establish common formats for electronic documents that can allow for a wide range of interactions to be partially automated – including various elements of design as well as ordering and invoicing. Organisational challenges have made the take-up of EDI slower than anticipated, but a substantial industrial use has developed.

*Dimension 3: The Service Delivery System / Organisation*

The third dimension – involving service delivery *system* and *organisation* – is often directly related to the previously discussed dimension – referring to the linkage between the service provider and its client (the client interface). The delivery is one specific type of interaction across the client interface (others including financial transactions, design inputs, after sales, and so on). However, dimension 3 is different. It refers to the *internal organisational arrangements* that have to be managed to allow service workers to perform their job properly, and to develop and offer innovative services. It is closely related to the question of how to empower employees, to facilitate them so that they can perform their jobs and deliver service products adequately. On the one hand, new services may require new organisational forms, (inter)personal capabilities, and skills. On the other hand, an organisation can be designed, and employees can be trained, so as to leave room for innovations and non-conventional solutions to practical problems.

*Box 3. "Delivery System and Organisation Innovations"*

- The large-scale introduction of home shopping services – or e-commerce – may cause a substantial change in the ways in which service provider and client relate.
- Introducing e-commerce in business processes may require serious business process reengineering. E-commerce may not only have a substantial impact on the way in which the actual commercial transactions occur, but also the processes preceding and following the transaction.
- In more traditional shopping environments, the lengthening of retailer opening hours may have serious consequences for the type of customers it attracts, the type of products offered, the immediate availability of sales and after sales service of different types, etc.

*Dimension 4: technological options*

The fourth dimension is the centre of much analysis and debate, especially concerning the degree to which service firms themselves in practice are giving shape to technology development. Clearly, service innovation is possible without technological innovation; technology is not always a dimension. Nonetheless, in practice there is a wide range of relationships between 'technology' and 'service



innovation', varying from technology mainly playing a role as a facilitating or enabling factor, to something much closer to supply-push, technology-driven innovation.

Service firms also differ in their awareness of relevant available technological options, the degree to which they dispose of the necessary technology themselves or have access to the necessary knowledge and the degree to which they consequently can act as demanding customers and articulate their technological needs. Many innovations are driven by downstream service sectors and can surely be considered user-dominated. In fact, users may play a crucial role in developing and implementing new services, although some of the required technologies may come from suppliers.

Although IT is certainly not the only relevant technology in services innovation, the reason why IT is often described as a revolutionary technology is that it is so pervasive, with numerous information processing tasks to which it could be applied, being intrinsic to almost all economic activities. IT is often perceived as the great enabler of services innovation. Many commentators who recognise the profound implications of IT for services still, however, consider this technology as typically supplier-dominated. It is true that many smaller and less innovative service firms are relatively less proactive where it comes to incorporating new IT, though even here there is rarely the purely passive process of absorption implied by the term "diffusion". However, in many larger and/or more advanced firms there is an extremely active process of technological development going on.

The examples of IT utilisation in box 4 illustrate that service firms are not necessarily supplier-dominated. This is especially true in the case of IT services themselves, like software houses. To a certain degree software firms have to adapt their activities to new products from hardware companies, e.g. new generations of chips. This involves near-continual updating and – typically – expansion of software to exploit the facilities of new equipment. But the process of developing new applications, new functionality, new interfaces, etc., is much more in the software firms' hands. It is also especially evident that sectors with a long experience of IT investment are major sources of innovation – in the shape of new configurations of hardware, new software and applications, new interfaces, etc. A good example is the financial sector, which is a huge employer of software and networking staff.

*Box 4. "Technological Innovations"*

- Large retail stores increasingly resemble financial services in their IT use. For instance, the UK supermarket Tesco has set up an Internet Service Provider, and many supermarkets are offering banking and insurance services.
- Tracking & tracing systems enable transport service providers to monitor the progress of their fleet and thus to manage their transport services more closely.

### 2.3 Linking the four dimensions

Any service innovation involves a specific combination of the above-mentioned dimensions of service innovation. A complete new service will usually mean that a new service delivery system will have to be developed, employees will have to change the way they work or relate to customers (the client interface), the way IT is used in business processes, whereas a new service concept may also be involved. Apart from the meaning of these four dimensions separately as discrete vectors of change, the linkages between these dimensions may be of even more significance.

Often these cross-linkages are forged in practice by those responsible for marketing, organisation development and distribution. For instance, launching a new service concept (for existing or new clients) requires marketing expertise. Similarly, creating an adequate interface with clients, and adapting the service delivery system, require knowledge of how services are distributed (both in terms of where they are produced and of how they are delivered). The decision as to whether to develop new services requires also organisational knowledge: can the current organisation deliver the new service? What organisational changes might be needed?

The point here is that a particular service innovation may be characterised by one dominant feature related to one of the above-mentioned dimensions; quite likely, this particular feature will prompt a set of changes in other dimensions, in order to bring about a successful innovation.

#### *Box 5: An example from the retail service sector*

- Intelligent cash registers and advanced data warehousing (basically a technological option; dimension 4) allow for the creation of detailed client profiles and personalised product offerings. However, these applications cannot be bought from the shelf and be simply implemented. They need to be combined with the specific characteristics of the shop formula at hand (dimension 1), the way the retailer wants to communicate with its clients (dimension 2), the way the employees are trained (dimension 3), etc.

In practice, it may be the combination of these dimensions which will characterise that particular service innovation in the end. The weight of the individual dimensions, and the importance of the various linkages between them, varies across individual services, innovations and firms. Similarly, the inputs required to link the dimensions in practice differ according to the type of service, the extent to which the search and selection process (inherent in all innovation processes) is formalised.

Examples of innovative service activities on the four dimensions identified in this chapter for the 6 SIID service sectors are included in Appendix A.

### 3. MAPPING SERVICE INNOVATION PATTERNS

In this chapter we will elaborate on the different patterns of service innovation. Just as service innovations are extremely varied, so the role of service firms in innovation processes is quite diverse. The picture of supplier dominated innovation in services is the dominant view. Service firms are then dependent on their suppliers for innovative inputs. These inputs are then to different degrees transformed into more or less innovative service offerings. However, the contribution of service firms to innovation is broader. Especially if we include the non-technological aspects of innovation. Some services even are playing a role in innovation processes of their clients as is the case with e.g. R&D, design & engineering services and some IT services. Further some typical business processes with a service character (service functions) are part of manufacturing firms – and hence seldom interpreted as service activities – or gradually develop into separate business. Below, a typology<sup>5</sup> of seven innovation patterns, in each of which service firms play a different role, is presented. Each of the patterns show a different mix of linkages between three role categories in a very basic value system:

- suppliers of inputs (equipment, capital, human resources, etc.),
- the (innovating) service firms, and
- the clients of the innovative service product (another service or manufacturing firm in the case of intermediate products, or final users).

Going from pattern 1 to 4, the influence of the client firm or final consumer exerts on the innovation process, gradually increases. Pattern 5 represents a somewhat different situation as all actors in the value system contribute to a particular innovation or are forced to accommodate it. The various patterns are visualised in figure 2.

#### 1. **Supplier-dominated innovation.**

This pattern represents the way services innovations are mostly depicted: innovation (as a rule technological innovation) is derived from hardware industries in particular. These innovations – coming from an external supplier – are disseminated and implemented by service industry users, who in their turn satisfy the needs of their clients. A few examples of this pattern:

- Microwave introduction has greatly extended food preparation possibilities in cafes and restaurants<sup>6</sup>.
- Cash registers and mobile phones have been assimilated into many small firms that use little new technology otherwise.

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<sup>5</sup> This overview is to be considered a mapping device: quite likely more patterns can be found.

<sup>6</sup> As a second order impact, it has led to heated food being made available in many locations that previously served at best cold food only.

There are many similar examples, with a clear “technology push”. Typical for this pattern is, at least initially, less room for user industries to influence the actual product supplied by the supplier. The adopting firm often has to bring about some organisational changes in order to be able to use the innovation - to adapt its organisation, train its employees, etc. – and to offer more efficient and higher quality services as a result.

2. **Innovation within services.** In this pattern, the actual innovation and implementation take place in the service firm itself. Such innovations can be both technological and non-technological, in many cases in combination. Examples of this pattern:

- a new product, or product bundle, or a new delivery system that is thought up in the service firm itself (e.g. by a new business team), and implemented throughout the organisation, possibly with ‘innovation support’ from outside.

3. **Client-led innovation.** This pattern represents more a variety of other patterns than a category in its own right. In this case the service firm is responding to needs clearly articulated by its clients. While in a sense every successful innovation is a reaction to a perceived market need, be it in a latent or more articulated way, for some service innovations this is more clear-cut than for others. Some examples:

- Offering door-to-door public transport services aimed at the business traveller can be considered a clear answer to the often heard complaints that they ‘would like to use public transport (the train) more often, but that pre- and post train transport is too time consuming’.
- The introduction of green banking products is a clear response to a growing number of individuals that want to invest their (saved) money in a ‘societal responsible’ way.
- The possibility of subscribing to a ‘selection of organically grown vegetables of the season every week’ is demand-led as well.

In these cases the demands are expressed by segments of mass markets. In many other cases the influence may come from a single client, which is often the case in business services.

- For instance, a client may propose that a training firm starts backing up its face-to-face sessions with computer-based aids.

4. **Innovation through services.** This pattern is one of the more complicated patterns. In this case service firms influence the actual innovation process taking place within the client firm, by providing inputs. The provider of intermediate services may provide knowledge resources that support the innovation process in various ways. Some examples:

- Providing an expert project manager with the necessary skills to implement an innovation.
- Providing an innovative tailor-made software package.

- Providing training or written advice regarding product selection and implementation.
- Providing advice on how to conduct the innovation process, or providing support tools to foster creativity among teams in the client organisation.

Different modes of support coexist in the providing these kind of – often knowledge-intensive – business services. An engineering consulting firm may support an oil and gas company that wants to drill and explore in a ‘protected’ area, and has to find new operational methods to meet the strict environment protection rules. The engineers can help through reviewing existing practice, proposing new operations, designing new methods, training the operators of the client firm, actually heading the drilling operations, etc. Despite these inputs, much if not all of the actual innovation takes place at the client’s site, and with its personnel of the client (cf. Hoffman et al., 1998). In this case the engineering firm facilitates the innovation process at the client firm. However, the precise role (source, carrier, facilitator) of the intermediate service provider and the degree of interactivity between service provider and client firm may vary substantially (cf. Bilderbeek et al., 1997).

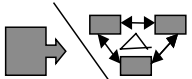



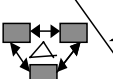


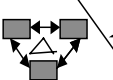


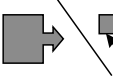

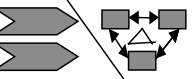
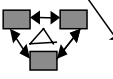







5. **Paradigmatic innovations.** This pattern involves complex and pervasive innovations affecting all actors in a value chain in a very profound way. Using Freeman’s terminology they are labelled technological revolutions or new technology systems when they are driven by fundamentally new technologies, but they may also be driven by regulations, resource constraints, and the like. These may require innovation to take place in all subsequent elements of the value system. This type of innovation implies completely new infrastructures, new types of knowledge and adaptation on the part of intermediate and final users. For example:

- if in a very densely populated area the regular transport of goods is no longer possible and the decision to switch to underground transport was taken, parties across the value chain would have to innovate and change practices. Manufacturers of transport equipment would have to provide completely new transport equipment; transport companies would have to change their service offerings, retrain their personnel, market their product in different ways; users would have to change their behaviour and use of transport facilities.
- Similarly, the switch from a few public TV channels towards multi-channel pay-per-view regimes require innovations and change of behaviour on many fronts.
- The large-scale introduction of multi-functional chipcards would be another example of a paradigmatic innovation.

Further innovation patterns could easily be identified by, for example, taking into account additional variables. One such factor might be the role of the government as a trigger for innovation. This role can be quite important – certain types of innovation may be promoted by R&D funding and/or

procurement decisions, or through new regulations (e.g. in fostering environmental innovation). Another variable may be the degree to which end-users are given the opportunity (or are simply forced) to co-produce particular services (the shift to “self-servicing” is an important aspect of services innovation).

Figure 2: Patterns of Services Innovation

INNOVATION PATTERN	ROLE SUPPLIER	ROLE SERVICE FIRM	ROLE CLIENT FIRM (serv/manuf.)	EXAMPLE
SUPPLIER DOMINATED INNOVATION				Introduction of interactive TV equipment, ICT goods, magnetrons, medical robots
INNOVATION IN SERVICES				Introduction of new shop formula, new pension and saving schemes
CLIENT-LED INNOVATION				Green banking services, door-to-door transport,
INNOVATION THROUGH SERVICES				Engineering firms helping oil/gas firms in designing new oil rigs, etc.
PARADIGMATIC INNOVATIONS				Multifunctional chipcards, sub soil transport services
<b>LEGENDA</b>  INPUTS FOR SERVICE PRODUCT  SUPPLIER DOMINATION (PUSH)  IMPLEMENTATION NEW SERVICE PRODUCT/ORGANISATION  LOCUS INNOVATION ACTIVITY  USER DOMINATION (PULL)  USER OF INNOVATIVE SERVICE PRODUCT				

The above-sketched typology clearly indicated how different the role of service firms in innovation processes may be. Secondly, the way service providers and client firms interact may be considered central to the process of service innovation. Both factors have to be taken into account in developing a system of indicators for service innovation.

However, many variations on these innovation patterns can be found in practice. Sometimes innovation takes place in individual service functions for example (irrespective whether it is a service or manufacturing firm), that might or might not be subsequently outsourced to specialised service firms. The 2 situations described below could also be seen as two additional patterns of service innovation.

- **Innovation in a firm’s internalised service function.** This pattern is extremely common. All firms are inevitably engaged in a range of service activities – and sometimes this involves

innovation. A capital goods manufacturer may be known for the quality of its products, but also for its innovative leasing scheme, its well-organised dealer organisation, its after sales service or its custom-made training sessions. In general, this category of innovation is grossly overlooked in innovation studies. We suspect that conventional innovation surveys tend to miss much innovation in areas like after-sales and marketing. But increasingly manufacturing firms realise that the package of services offered around the actual good can make the difference between staying competitive or not. Quite frequently, the value-added realised with these services is much higher than the margins realised on the capital goods.

- **Innovation in an outsourced service function.** Facilities management, catering and cleaning, etc. are typical examples of service functions being outsourced, although the outsourcing of many more strategic functions (e.g. temporary sales, management and similar services, and contract R&D services) is becoming more common rapidly. In most cases more specialised service firms take over these functions<sup>7</sup>. In many outsourcing relationships, activities may be precisely specified and cost competition may be intense; in such cases, innovation is less likely. But in other cases, there is sufficient level of specialisation and scope for economies of scale to provide incentives for innovative solutions. For instance, companies increasingly hire temporary labour, and increasingly the troublesome task of managing these temporary workers and the associated paperwork can be outsourced to a temporary employment agency. In their turn, such agencies increasingly get to know which human resources are required by that particular client firm, and may even offer to completely take over the human resources management function. This may include training personnel, hiring additional personnel, or helping displaced staff to find another job, etc.

In appendix B an overview is included on dominant innovation patterns in the 6 SIID service sectors.

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<sup>7</sup> This pattern resembles the previous one, but it goes a step further. In this case the client firm influences the innovation taking place in the outsourced service function.

#### **4. IMPLICATIONS FOR THE CONSTRUCTION OF THE SIID SECTORAL DATABASE**

Both the four dimensional model for characterising innovative activities in services and the typology of service innovation patterns have implications for the actual design and construction of the SIID sectoral database. These include:

- Indicators measuring innovation activity in each of the SIID service industries should cover – as much as possible – all four dimensions identified. This implies that – for instance in the assessment of innovative activities in retailing – we not only need to focus on the number of new shop formulas introduced in a particular year (new service concept), but also the degree to which the opportunities of ICT for inventory management or managing supply chains are used (technological options), the degree to which a one-to-one communication with clients is established (new client interface) and new type of service functions created (new service delivery system).
- Indicators need to be chosen in such a way as to cover as much as possible the relevant innovation pattern in the SIID service industry at hand. This would imply that the indicators to be selected for engineering consulting should focus on the interactive or co-production aspect whereas in transport the aspect of supplier domination is relatively important (for example the average age of capital equipment).

A confrontation with the collection of possible indicators identified in the feasibility stage (see appendix C for an overview) reveals that not all dimensions of service innovation are equally represented in these listings. It is for example less difficult to find indicators for investments made in innovating the service organisation whereas reliable indicators for measuring new service concepts are much harder to find. Furthermore, a fair number of indicators listed in appendix C have a rather general character and cannot immediately be linked to one of the four dimensions identified in this paper, at best indirectly.

We can conclude that developing the sectoral database will require quite some effort given the demanding criteria for inclusion, namely:

- A system of indicators for service innovation should cover all 4 dimensions identified in this paper as well as pay attention to characteristics of the relevant innovation pattern of the industry in question.
- Ideally a mixture of input, throughput and output indicators should be included in the database.
- Indicators should measure innovation activity as directly as possible; this clearly limits the appropriateness of more general (and mostly indirect) indicators (which are sometimes more readily available). General indicators tend to have a more implicit relationship with



innovativeness, leaving largely open to what extent and how service innovation is actually indicated.

- As indicators of sectoral innovation activity will be partly included in the macro- and micro database it needs to be decided to what degree these need to be included in the sectoral database as well.
- As the SIID database aims at international comparability indicators should be available in most countries included in the SIID database; and
- Finally, the various indicators selected will most likely differ per industry and therefore need to be aggregated in a sensible way as to allow cross-industry comparisons.

Developing the sectoral SIID database requires a well-developed understanding of innovation activity in the individual industries. Our proposal is to take one or two of the SIID industries and on the basis of a combination of a qualitative assessment of innovation in the industry and consultation with representatives of the industry itself develop a set of approximately 10 indicators that together meet the criteria just outlined.

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**APPENDIX A:           EXAMPLES OF INNOVATIVE ACTIVITIES IN SIID-SERVICE INDUSTRIES**

Below, we shall use the four dimensions introduced in chapter 2 for systematically providing examples of innovation in service activities in each of the SIID service sectors: transport services, wholesale services, retail services, financial services, temporary work services, and engineering consulting services.

Transport	<p>Door-to-door public transport: People complain that public transport only does part of the job; to get to and from their precise destinations, after a train or plane ride, for example, can be very time-consuming. Door-to-door transport services is a new concept, a new way of thinking about public transport, that addresses this user need.</p> <p>Container line services.</p> <p>Installation of equipment by chauffeurs (e.g. copiers).</p>
Wholesale <sup>8</sup>	<p>‘Informational wholesale without having physical wholesale function’ (Technische Unie).</p>
Retailing	<p>New shop formulas.</p> <p>Small supermarkets in gas stations.</p> <p>Even in conventional shopping environments, supermarkets have identified queuing at check-outs as a major source of customer frustration, and are in some cases introducing self-service scanners for the customers to use on their own purchases as they enter the shopping trolley.</p>
Financial services	<p>Green &amp; charity banking schemes: As more people are actively managing their private financial matters, and as governments are ruling that donations to certain charities are tax deductible, some insurance firms and credit card companies have started to offer services in which these elements are coupled. The concept of saving/spending money not only to help yourself but also to let others benefit from your savings or purchases is a new service concept.</p> <p>Click funds.</p> <p>Equity based mortgages (beleggingshypotheek)</p>
Temporary staffing	<p>Temporary employment services are being applied to specific market niches, including now some highly expert and knowledge-intensive roles such as temporary legal personnel and interim management. Another new concept involves labour pool management by temporary employment agencies.</p> <p>Labour pool management.</p> <p>Highly specialised temporary staffing bureaus/interim personnel (legal, medical, etc.).</p> <p>Call centre services.</p>
Engineering consulting	<p>Eco-design services offer strategies for greening of production processes and products of their clients. Some installation and maintenance firms have developed one-stop shopping facilities management service concepts, etc.</p>

<sup>8</sup> Transport and wholesale are increasingly developing/merging into logistics services.

<i>Table A.2 Client interface based service innovations: examples drawn from SIID service industries</i>	
Transport	Multi-modal chipcard-based tickets. Checking in from a distance. Tracking & tracing of parcels by customers using the Internet
Wholesale	New ways of presenting catalogues. Micro-just in time deliveries to clients. Selling equipment and service elements such as installation, customer instruction & training.
Retailing	<p>An example is a UK supermarket, which is considering using its warehouse of data on customer purchasers to generate and target special offers at specific consumers – an example being that someone who regularly buys toothpaste in the supermarket may be given special inducements to buy toothbrushes there as well, at regular intervals. Such special offers are currently made available postally to large groups of customers: the plan is that they will be targeted at very small groups and even individuals on hand-held terminals used for scanning purchases in the supermarket, and eventually be made available on teleshopping systems.</p> <p>Typically these interface innovations involve the use of, and can contribute massively to the development of, databases on clients and potential clients. As these are elaborated, there is scope for more product differentiation, more niche marketing, etc. In some cases there are associated innovations such as loyalty cards which reward customers from providing information as to their purchasing patterns.</p> <p>Customer loyalty schemes. Telemarketing. Self-service scanners on supermarket trolleys</p>
Financial services	<p>Direct banking/direct writing: Direct banking or direct writing in the insurance industry is not necessarily a change in the <i>service offer</i>, but does involve dramatic change in the way in which the banks and insurance companies relate to their clients.</p> <p>Firms in the financial sector usually purchase their IT hardware on the market (in Europe – at one time in Brazil banks were involved in computer design and manufacture!) But they possess huge IT departments, which were typically developed mainly to focus on large-scale back office automation (processing large volumes of data on clients and personnel), and grew to support ATMs and similar client interfaces. Banks have played an important role in the design of these interfaces, commissioning their own research on ATMs, etc.</p> <p>Massive use of call services for providing services. Use of help desks. Targeted offerings of new financial products (e.g. the introduction of a new IT fund)</p>
Temporary staffing	Self assessment tools in temporary staffing agencies, job search on the Internet without interference of staff. Take-over of human resource function by temporary employment agencies. Separate bureau's of staffing agencies by massive lay offs.
Engineering consulting	Elaborated account management systems. Outsourced help desk functions. Providing information on samples using specified electronic format. Dedicated project bureaus together with principals to facilitate interaction with client firm. Telemonitoring.

Transport	Wide scale introduction of barcodes reduces the chance of mistakes in entering orders. Educating lorry drivers to act as market intelligence.
Wholesale	
Retailing	The formulas employed by such chains as McDonalds and Kwik-Fit can be considered as service concepts; but at the same time they are at their core delivery systems whose elements have proved popular and much imitated. A central element of this “Fordism” in services is ensuring that clients are served rapidly with a standard quality product, with very little variation across locations. To achieve this means heavy investment in developing employee capacities and motivation on the part of the firm. Changes needed for implementing e-commerce. Implementing teleshopping services.
Financial services	The ATM is a technological innovation, but it is as much an innovation in how the bank relates to its clients in the delivery of services. Personal advice on financial planning requires new skills/types of employees. Establishing extensive call centres and help desks. Advanced software applications to allow for cross selling of products.
Temporary staffing	Temporary employment agencies providing training courses to candidates (relational service), teaming up with government agencies for placing the unemployed. New ways of actively approaching employers in a particular region. New ways of sharing contacts and knowledge (knowledge management).
Engineering consulting	Engineering and testing firms using laboratory information systems have introduced systems which render them able to analyse samples or components provided to them by clients on a large scale. They are able to generate the results of their tests electronically, and feed back these results electronically to the client firm – in required formats – as soon as the analyses are available. This way of delivering the informational service has substantial consequences for the internal organisational set-up of the engineering firm. Turn key delivery (and what it requires to attain this), certification of individual professionals. Advanced project management capabilities.

<sup>9</sup> This dimension is hard to identify separately as most innovations on dimension 1.2 and 4 have implications for this dimension, but it seldom is a separate base for innovation.

<i>Table A.4 Technological service innovations: examples drawn from SIID service industries</i>	
Transport	All sorts and variations of tracking & tracing, fleet management systems. Chipcard-based ticketing systems. Container-based innovations.
Wholesale	Tele-auctioning of flowers. Wide-scale application of e-commerce. All varieties of just-in time applications based on having insight into the whole value chain.
Retailing	In retailing, loyalty cards, intelligent cash registers and advanced data warehousing allow for the creation of detailed client profiles and personalised product offerings. These applications are not simply bought from the shelf and implemented (at least not at present). They need to be combined with the specific characteristics of the store/chain (dimension 1), the way the retailer wants to communicate with its clients (dimension 2), the way the employees are trained (dimension 3), etc. Scanning cash registers. Automatic ordering systems. Advanced data warehousing and the marketing based hereon.
Financial services	Now these resources are increasingly for developing new service products (such as e-commerce, Internet banking and a multitude of services in which customers to a certain extent manage their own 'funds'). Some banks have invested so heavily in IT infrastructures - e.g. telecom networks - that they even have entered telecommunications markets (e.g. the managed data network service Fastrack, growing out of the Midland bank in the UK) or start developing new IT-based services outside the realm of financial services (e.g. again in the UK, the Nationwide Building Society has set up as an internet Service Provider). Mastery of IT has become so strategic, and banks, insurance firms and similar bodies so proactive in their use of the technology, that the new services developed by the financial sector are an important source of new demands on the technology suppliers. ATMs, new payment systems (varieties of multifunctional chipcards). Advanced datawarehousing and marketing based hereon.
Temporary staffing	Intelligent queries to find most suitable temporary jobs for a certain candidate. Self assessment tools for potential temporary staff.
Engineering consulting	Engineering firms are perhaps even more active shapers of IT. For example, some of their design services are delivered in the form of custom made hardware such as new devices for measuring sub sea level water dynamics, or software, such as GIS software for mapping large scale soil pollution. (Other GIS applications are developed by KIBS specialising in ecological and market research topics.) All sort of technological innovations from new varieties of tarmac, new filtering techniques for reusing waste water, to new ways of exploring oil reserves to new (light) construction techniques and so on and so forth.



**APPENDIX B: FIRST ASSESSMENT OF DOMINANT INNOVATION PATTERNS IN SIID-SERVICE INDUSTRIES**

If we start from the perspective of the service firm (see figure 2) the following dominating innovation patterns can be identified in the 6 SIID service industries.

<i>Industry</i>	<i>Dominating innovation pattern</i>
Transport	Mainly supplier dominated innovation (i.e. in the case of technology based innovations such as fleet management system or for that matter the introduction of containers in transport) and to a lesser extend innovation in services (new reduction scheme in public transport, or garages offering combined private and public transport solutions). Further the transport function of non transport firms is quite often outsourced to specialised transport firms broadening the basis for specialised transport services e.g. just in time deliveries. From the perspective of the outsourcing firm this would imply innovation in outsourced innovation function.
Wholesale	Mainly supplier dominated innovation (e.g. IT based warehousing, just in time deliveries) and to a lesser extend innovation in services (e.g. if the wholesaler develops into a logistics service provider only matches supply and demand in a virtual way and leaves the physical delivery to the original manufacturer).
Retailing	In retailing conceptual innovation is dominating i.e. innovation in services pattern (e.g. the launching of a new shop formulae), but supplier dominated innovation patterns (e.g. scanning devices) and even paradigmatic innovation patterns can be identified (e.g. when switching on a large scale to electronic commerce).
Financial Services	In financial services various innovation patterns can be traced. Supplier dominated innovation (e.g. the introduction of ATMs) used to be important, but increasingly the innovation in services to a different degree pulled trough by clients is a relevant pattern (e.g. in green banking). One could even argue that electronic commerce and the consequences for telebanking, directbanking and electronic payment systems in fact is an example of a paradigmatic innovation for financial services.
Temporary staffing services	The various formats in which temporary staffing services enter the market can be labelled as examples of the innovation in services pattern in which the emphasis of the innovation is on innovation in the service firm itself. Increasingly, however, staffing agencies take over the human resource function of clients (innovation through services or innovation in an outsourced service function). 6
Engineering Consulting	Typically innovation in engineering is an act of co-production and most often takes place in the client firm. This can imply that the engineering firm support the client firm in innovation (pattern 4) or is actually operating within the client firm. In some cases the client firm might completely outsource the engineering function to the engineering firm and expect innovative solutions (this is quite common in oil construction).

**ANNEX C: POSSIBLE INDICATORS OF SERVICE INNOVATION IN SIID SERVICE SECTORS (SECTORAL DATABASE)**

Possible indicators for <u>TRANSPORT</u> Industry	macro	meso	Micro	input	thru-put	output
<i>Category A</i>						
• Average number of new firms (NIWO)	•	•		♦		
• Education level of employees (CBS)	•	•		♦		
• Participation and investments in vocational training (CBS)		•	•	♦		
• Average age of transportation equipment (CBS)		•	•		♦	
• Average fuel consumption per ton per 100 kms. (TLN)		•	•		♦	
• Share of intermodal transport (TLN) Scania Beers, BDF, FTA)		•	•		♦	
• Share of foreign firms on Dutch market	•	•			♦	
• Share of specialized forms of transportation (CBS)		•	•		♦	
• Share of container transport (CBS)		•	•		♦	
• Average load factor per modality (TLN, NIWO, NEI, CBS)		•	•			♦
• Average number of kms. per truck (CBS)		•	•			♦
• Turnover per employee (CBS)	•	•				♦
• Number of bankruptcies per year (NIWO)	•	•				♦
• Added value per modality (NEI, TLN)		•	•			♦
<i>Category B</i>						
• ICT investments per year		•	•	♦		
• Investments in software development		•	•	♦		
• Use of advanced ICT systems: route planning, fleet management, mobile telephones, satellite tracing, stock management, EDI or on-line communication, integrated logistic management, cargo exchange, electronic invoicing, etc.		•	•		♦	
• Share of regular clients		•	•		♦	
• % continuously traceable goods in transport		•	•			♦
• % firms with supplementary services		•	•			♦
• Costs of trans-shipment		•	•			♦
• Ratio direct-indirect workers		•	•			♦
• Average value of transport per unit		•	•			♦
• Average number of customers		•	•			♦
<i>Category C</i>						
Share of timely deliveries		•	•			♦
Order accuracy		•	•			♦
Share of damaged goods		•	•			♦
Costs of keeping stock		•	•			♦
Overhead costs		•	•			♦

Possible indicators for <b>WHOLESALE industry</b>	macro	meso	micro	input	thru-put	output
<i>Category A</i>						
<ul style="list-style-type: none"> <li>• Investment and participation in vocational training (CBS)</li> <li>• Education level of employees (CBS)</li> <li>• Share of new firms (CBS)</li> <li>• Average investment level per settlement (CBS)</li> <li>• ICT investments (EIM)</li> <li>• Degree of automation (EIM, CBS)</li> <li>• Penetration of EDI (EIM, CBS)</li> <li>• Penetration of other external data communication (EIM, CBS)</li> <li>• Velocity of circulation of stock (EIM, CBS)</li> <li>• Average value of stock (EIM, CBS)</li> <li>• Average in-stock time (EIM, CBS)</li> <li>• Turnover per work hour (part-time/full time/emergency help) (CBS)</li> <li>• Number of bankruptcies per year (CBS)</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>
<i>Category B</i>						
<ul style="list-style-type: none"> <li>• Investments in software</li> <li>• Marketing expenditure</li> <li>• Share of electronic payments</li> <li>• Use of house brands</li> <li>• Deliveries with knowledge transfer (installation/advice/training)</li> <li>• Use of specialized software for cost price calculation</li> <li>• Use of stock management systems (bar codes)</li> <li>• Average time to delivery</li> <li>• Average gross margin of total assortment</li> <li>• Share of electronic orders</li> <li>• Share of new products in turnover</li> <li>• Share of regular clients</li> </ul>		<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>
<i>Category C</i>						
<ul style="list-style-type: none"> <li>• Use of external advisors</li> <li>• Use of quality systems</li> <li>• Depth and width of assortment</li> <li>• Share of timely deliveries</li> <li>• Order accuracy</li> <li>• Average purchase amount per client</li> </ul>		<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>		<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>
<i>Remaining indicators</i>						
<ul style="list-style-type: none"> <li>• % firms with supplementary services</li> <li>• % firms with a service organization</li> </ul>		<ul style="list-style-type: none"> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> </ul>			<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> </ul>

Possible indicators for <b>RETAILING industry</b>	macro	meso	Micro	input	thru-put	output
<i>Category A</i>						
<ul style="list-style-type: none"> <li>• Investment and participation in vocational training (CBS)</li> <li>• Education level of employees (CBS)</li> <li>• Share of new firms (CBS)</li> <li>• Average investment level per settlement (CBS)</li> <li>• ICT investments (EIM)</li> <li>• Degree of automation (EIM, CBS)</li> <li>• Penetration of EDI (EIM, CBS)</li> <li>• Penetration of other external data communication (EIM, CBS)</li> <li>• Share of foreign retailers on Dutch market</li> <li>• Turnover of Dutch retailers abroad</li> <li>• Turnover per work hour (part-time/full time/emergency help) (CBS)</li> <li>• Number of bankruptcies per year (CBS)</li> <li>• Turnover per square meter (shop and non-shop area) (CBS)</li> <li>• Opening hours</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>
<i>Category B</i>						
<ul style="list-style-type: none"> <li>• Investments in software</li> <li>• Share of electronic payments</li> <li>• Share of scanning cash points</li> <li>• Use of Direct Product Profitability (DPP) system</li> <li>• Use of house brands</li> <li>• Electronic coupling of cash points to stock management</li> <li>• Use of chip card related registration of client data</li> <li>• Turnover per settlement</li> <li>• Velocity of circulation of stock</li> <li>• Costs of keeping stock</li> <li>• Average gross margin of total assortment</li> <li>• Share of electronic orders</li> <li>• Turnover from teleshopping</li> <li>• Share of new products in turnover</li> <li>• Number of new formulas introduced</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>
<i>Category C</i>						
<ul style="list-style-type: none"> <li>• Average life of capital goods</li> <li>• Use of external advisors</li> <li>• Use of quality systems</li> <li>• Depth and width of assortment</li> <li>• Average purchase amount per client</li> <li>• Conversion factor</li> <li>• Share of regular clients</li> <li>• Wait for customers</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> <li>♦</li> </ul>
<i>Remaining indicators</i>						
<ul style="list-style-type: none"> <li>• Share of multiple stores relative to independents</li> <li>• Share of purchasing co-operation, purchasing and sales co-operation, formula co-operation (franchising)</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> </ul>	<ul style="list-style-type: none"> <li>♦</li> <li>♦</li> </ul>

Possible indicator for <b>FINANCIAL industry</b>	macro	meso	micro	input	thru-put	output
<i>Category A</i>						
• Investment and participation in vocational training (CBS)		•	•	♦		
• Education level of employees (CBS)	•	•		♦		
• ICT investments (CBS)		•	•	♦		
• Degree of automation (EIM,CBS)		•	•		♦	
• Penetration of EDI (EIM, CBS)		•	•		♦	
• Penetration of other external data communication (EIM, CBS)		•	•		♦	
• Number of cash dispensers		•	•		♦	
• Share of foreign firms on Dutch market (CBS)	•	•			♦	
• Turnover of Dutch firms abroad (CBS)	•	•				♦
• Turnover per work hour (CBS)		•	•			♦
• Number of bankruptcies per year (CBS)	•	•				♦
<i>Category B</i>						
• Size of Business Development department		•	•	♦		
• Size of office network		•	•	♦		
• Foreign Direct Investments		•	•	♦		
• Number of transactions per cash dispenser		•	•		♦	
• Diffusion of chip cards / chip card machines		•	•		♦	
• Share of firms with call centres (own personnel or outsourced)		•	•		♦	
• Share of electronic transfers		•	•		♦	
• Ratio front office / back office personnel		•	•		♦	
• Use of new distribution forms (electronic, phone banking)		•	•		♦	
• Number of alliances with non-financial		•	•		♦	
• Number of banking products / insurance policies services firms		•	•			♦
• Turnover with recently introduced products		•	•			♦
• Number of product innovations per year		•	•			♦
• Share of combined banking and insurance services in turnover		•	•			♦
• Average number of policies with one customer		•	•			♦
<i>Category C</i>						
• Use of external advisors		•	•		♦	
• Speed of making an offer		•	•			♦
• Speed and way of claims processing		•	•			♦
• Turnover per customer		•	•			♦
• Standard vs. custom made products		•	•			♦

Possible indicator for <b>TEMPORARY STAFFING industry</b>	macro	meso	micro	input	thru-put	output
<i>Category A</i>						
<ul style="list-style-type: none"> <li>• Percentage of non-temporary work services in net total turnover (CBS)</li> <li>• Percentage temporary employees 31 years and older (ABU)</li> <li>• Percentage of special target groups in total of temporary workers</li> <li>• Percentage of temporary workers with higher vocational or university training</li> <li>• Market share of temporary employment/ in the total market for 'flex market' (CBS)</li> <li>• Number of hours worked by temporary workers/agency or outlet (ABU)</li> <li>• Temporary workers that find a permanent job through temporary work (NEI)</li> <li>• Average number of days of training per employee per year</li> <li>• Turnover/ permanent staff</li> <li>• Turnover in the Netherlands as a percentage of turnover in the EU (ABU)</li> </ul>		•	•		♦	
		•	•	♦		
		•	•		♦	
		•	•	♦		
		•	•		♦	
		•	•			♦
	•	•	•	♦		♦
		•	•			♦
		•	•			♦
<i>Category B</i>						
<ul style="list-style-type: none"> <li>• Average duration of a temporary job</li> <li>• Supply of industry specific training (ABU)</li> <li>• Participation industry specific training (ABU)</li> <li>• Availability of advanced ICT systems</li> <li>• Average number of temporary work jobs available per year per agency or outlet (ABU)</li> </ul>	•	•	•	♦	♦	
		•	•		♦	
		•	•	♦		
		•	•			♦
<i>Category C</i>						
<ul style="list-style-type: none"> <li>• Use of advanced ICT systems</li> <li>• Average labour costs per intake (new applicant)</li> <li>• Average labour costs per temporary work job</li> <li>• Average number of days to fulfil a request of an employer</li> <li>• Number of new services and formulae introduced each year</li> <li>• Average number of hours worked by temporary workers per week per staff-member (intermediary)</li> <li>• Investments in product development</li> </ul>		•	•		♦	♦
		•	•			♦
		•	•			♦
		•	•		♦	
		•	•			♦
		•	•	♦		
		•	•			♦
		•	•	♦		
<i>Remaining indicators</i>						
<ul style="list-style-type: none"> <li>• Cost price/turnover (CBS)</li> <li>• Sales costs (a/o. marketing) as a percentage of exploitation costs (CBS)</li> </ul>		•	•			♦
		•	•			♦

Possible indicators for <b>TECHNICAL ENGINEERING</b> industry	macro	meso	micro	input	thru-put	output
<i>Category A</i>						
<ul style="list-style-type: none"> <li>• Availability of industry specific training</li> <li>• Participation in industry specific training</li> <li>• Average number of days of training per employee per year</li> <li>• Percentage of workers with higher vocational or university training (CBS)</li> <li>• Turnover / employee</li> <li>• Turnover in the Netherlands as a percentage of turnover in the EU</li> <li>• ICT investments per employee</li> </ul>		•	•	♦	♦	
<i>Category B</i>						
<ul style="list-style-type: none"> <li>• Number of employees involved in R&amp;D</li> <li>• Availability of advanced ICT systems</li> <li>• Foreign Direct Investments</li> <li>• Use of advanced ICT systems</li> <li>• Percentage of certified firms</li> <li>• Export share in turnover</li> <li>• Market share foreign competitors</li> <li>• Number of fee earners as a percentage of total number of employees</li> </ul>		•	•	♦		
<i>Category C</i>						
<ul style="list-style-type: none"> <li>• Number of hours (or FTE) aimed at R&amp;D</li> <li>• Investments in product development</li> <li>• Number of firms with a separate department R&amp;D or business development/new business</li> <li>• Number of new advisory products introduced per year</li> <li>• Turnover / new products &amp; services</li> <li>• Percentage of non-engineering in net total turnover (CBS)</li> <li>• Availability of common (internal) knowledge databases (electronically?)</li> <li>• Use of ICT for delivering service products to clients</li> <li>• Participation (government sponsored) applied research programmes</li> <li>• Average size contracted projects</li> </ul>		•	•	♦	♦	♦
<i>Remaining indicators</i>						
<ul style="list-style-type: none"> <li>• Cost price/turnover (CBS)</li> <li>• Sales costs (a/o. marketing) as a percentage of exploitation costs (CBS)</li> </ul>		•	•			♦