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TITLE

**Innovation and economic behaviour -  
Need for a new approach?**

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| <p>ABSTRACT</p> <p><i>The purpose of this paper is neither to give a new synthetic basis for the future development of the Oslo Manual, nor to provide a full review of all relevant issues. The purpose is limited to locating and raising some questions at the border of the Oslo Manual approach. Through this we hope to point to possible extensions of a properly revised Oslo Manual that allows it to continue to play an important role vis a vis innovation research and wider social use of innovation data.</i></p> |  |   |                               |
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## TABLE OF CONTENTS

|   |           |
|---|-----------|
| <b>Introduction .....</b>   | <b>1</b>  |
| <b>The limits of the Oslo process.....</b>  | <b>2</b>  |
| <b>What is innovation – and how may we conceive it? .....</b>                             | <b>3</b>  |
| <b>A theory of the innovating firm.....</b>   | <b>4</b>  |
| <b>TPP innovations - The Oslo Manual and CIS approach to innovation and services.....</b> | <b>9</b>  |
| The CIS rationale for measuring innovation.....   | 10        |
| The innovation concept.....   | 10        |
| <b>Outlining innovation in services.....</b>  | <b>17</b> |
| The starting point: Innovation blue prints.....   | 17        |
| In need of a wider innovation concept.....  | 18        |
| Delimiting innovation in services .....   | 21        |
| Attitudes and modes of service innovation.....  | 22        |
| The distinguishability of products and processes .....                                    | 23        |
| <b>Conclusions .....</b>  | <b>26</b> |
| <b>Figures .....</b>  | <b>28</b> |



## Introduction

This paper addresses two interrelated questions,

- what have been learnt about the contents and characteristics of innovation – of new economic activities in commercial firms – in the last decade?
- And, how does the Oslo Manual framework address these issues?

The discussion is based on the objectives of the Oslo Manual in its two previous editions and on the rationale behind its initial development during the 1990s. The paper is focussed on the conceptual foundation of the Manual and the relevance of this foundation for the purposes the Manual has been designed to address. A crucial point for any attempt to organise sustained efforts into mapping innovation and innovation performance must be to ensure that this conceptual basis is in line with the results and implications of recent socio-economic research on innovation and its impacts.

This raises questions first of all of the validity of concepts and principles organising data collection and analysis across industrial sectors and different market structures, and secondly of the proxy character of TPP innovations for mapping innovation dynamics at firm level across sectors and markets. The answers to questions as these are intimately linked to the objectives of the data collection – what analytical questions, policy issues and indicator problems are addressed. In revising the OECD/EUROSTAT Innovation Manual we have to ensure a reflexive and unbiased conceptual framework for innovation mapping, providing a ground for relevant both research and policy analysis and allow generation of comparable and realistic innovation statistics. Questions as these have implications for how the revision process is planned and what issues are to be addressed in this process.

The OECD/EUROSTAT Innovation Manual – the Oslo Manual – a core part of the Frascati family of S&T statistics and indicator manuals, has now passed its tenth anniversary. At start of its development – coming out of the agenda of the prominent OECD Technology/Economy Programme – it was a highly innovative and explorative initiative, attempting to cover an essentially white part of the map of the economic S&T landscape. Building on the experiences of i.a. the Yale surveys in the US and the 1988-89 Innovation Survey in the Nordic countries, as well as the extensive innovation research base that had been developed over several years and was given a fruitful focus and profile with the OECD TEP programme.

Just as the Frascati Manual contributed to refocused and improved science and research policies in industrialised countries during the 1960s, the Oslo Manual gave a strong impetus to the development of innovation policies in the 1990s. In the intervening years the Oslo Manual has proven its value and merit manifold – the initiative and the orientation it was given in 1991-92 was both right and important. However, at the time it was also a highly explorative initiative – hence, a core part of the aim of launching the Oslo Manual was to start a learning process, with a continual feedback between data collection and statistics generation on the one hand and on the other hand analysis of the data generated, experiences in the use of the associated indicators and wider socio-economic research on innovation constraints, processes, capabilities and impacts, as well as policy use and requirements. So, a vital question at this juncture in time is what have we learnt in the intervening ten years about innovation activities and their impact, how have the requirements to innovation statistics and related analysis changed, what do we know of innovation as a competitive tool for companies today and that was not included as part of the basis for the Innovation Manual. In the light of all this; what does present

innovation data really tell us – and does it really provide answers to the questions that still lies at the core of the Oslo Manual?

The purpose of this paper is neither to give a new synthetic basis for the future development of the Oslo Manual, nor to provide a full review of all relevant issues. The purpose is limited to locating and raising some questions at the border of the Oslo Manual approach. Through this we hope to point to possible extensions of a properly revised Oslo Manual that allows it to continue to play an important role vis a vis innovation research and wider social use of innovation data.

## **The limits of the Oslo process**

The starting point of any serious discourse on the objectives and design of a manual for economy-wide mapping of innovation activities and its immediate impacts would be to what economic activities we denote as ‘innovation’, and what general approach or model of these activities we conceive of that may form a viable basis for fulfilling the objectives that are set for the innovation activity mapping exercise. Ultimately the answer to the question of what ‘innovation’ is, is intimately linked to what questions about innovation we want to find answers for – the criteria used to identify one set of economic activities as innovation to distinguish it from other types of such activities must be adapted to the purposes of the analytical questions addressed. On the other hand the criteria must in each case reflect the economic context – or the market context – of the activities surveyed. At firm level whatever activities we define as ‘innovation’ are fundamentally shaped by the market; innovation activities are basically firms’ responses to their perceptions of the incentive structure the market context provides for the firm – relative to the goals and objectives of the firm.

Hence we need a critical appraisal of our approach to and definition of innovation activities at firm level, seeing this definition in the context of a wide range of types of market dynamics and the basic objectives of the mapping exercise. It is our contention that the Oslo Manual approach to date has failed in these respects – and as a consequence that there are basic uncertainties of what the corresponding innovation surveys actually measure.

When the development of the Oslo Manual was initiated more than ten years ago it was seen as the start of an explorative process – acknowledging the vast uncertainties about innovation processes and their impacts – an explicit aim of the manual was to provide an evolving basis for its own development and improvement, including its basic definitions. Rather the Oslo Manual framework, with both its strengths, limitations and weaknesses, has become a new kind of orthodoxy - an orthodoxy that have not followed up on the wide range of socio-economic research on innovation in the intervening years. We claim that the Oslo Manual is largely based on outmoded models of innovation – rooted in decades old models of industrial and commercial activity. Today the framework is stretched to – if not past – its limits. What should be the *result* of a broad and evolving discourse on the *why’s* and *how’s* of the identification of innovation – the Oslo Manual delimitation of the innovative activities it maps – increasingly seems rather to play the role of an objectified definition of innovation. The tautological – or axiomatic – character of the Oslo approach this implies; relevant innovation is whatever the Oslo Manual measures, is counterproductive and does not open for the required dialogue with an evolving socio-economic research agenda.

With this we have lost valuable momentum – and hence time. The up-coming revision process must encompass a thorough assessment of the conceptual basis of the present manual – an assessment that must be seen in conjunction with the necessary rethinking of the core objectives of the Oslo Manual for it to continue to play a central role in shaping both the innovation policy as well as the innovation research agenda.

As an extensive user of data generated on the basis of the Oslo Manual – through the CIS surveys – it is important to continue the collection and analysis of innovation data. Economic research on innovation is critically dependent on a sophisticated and evolving data resource. Similarly applies to innovation policy analysis. Hence an organised two level process is required – a short term goal of preparing for the next rounds of innovation surveys and a longer term goal of providing (1) a more suitable basis for future development of innovation statistics than the present Manual and (2) the organisation of a permanent conceptual discourse and development of the basis for innovation mapping – clearly missing today.

## What is innovation – and how may we conceive it?

Innovation is one of the – if not *the* – essential characteristics of the life of a firm. In fact it is so essential that a firm without innovation is a contradiction in terms. This fact is what makes innovation simple to grasp, but difficult to analyse and measure. It is customary to refer to Joseph Schumpeter as the originator of the idea that innovation was a vital aspect of the capitalist process – that innovation was basically the engine of capitalist development, driving processes leading to structural change and economic growth, as outlined in his major works *Theories of Economic Development* (1912, 1934) and *Business Cycles* (1938), as well as in his less pretentious “little book of essays”<sup>1</sup> *Capitalism, Socialism and Democracy*. However, Schumpeter’s agenda was restricted in today’s terms of economic innovation theories – as Geoffrey Hodges concludes, Schumpeter cannot be characterised as an evolutionary innovation economist. This implies severe limitations in our use of Schumpeter’s arguments and analysis – whether he is wrong or because of his restricted analytical perspective.

In one respect, however, he pointed in the correct direction – a firm operating on a market is participating in a competition that involves two different dimensions – a dimension basically based on doing what (most) other agents on the market does in a more efficient way; this is the ‘price’ competition – and a dimension pertaining to doing things differently from (most) other agents; the ‘technological’ – or better ‘functional’<sup>2</sup> – competition. These dimensions should not be thought of as different forms of competition – they are two aspects of the integrated competitive framework the firm is faced with in the market(s) it operates. These are dimensions of the market as an incentive structure – the firm’s decisions of how reply to this structure, its attempts to reap rewards and avoid penalties, are made along both. The inclinations of the replies differ across markets and within the same market, over time and simultaneously.

This forms the basis for stating the basic definition of innovation – innovation is as Schumpeter said “new ways of doing things in the way of economic life”. Innovation is about altered behaviour by firms in the market, irrespective of the dimensions it is a reply to. This behavioural approach to outlining innovation forms the basis of the following arguments and suggestions. The direct implication of this behavioural definition of innovation is that in a certain sense ‘innovation is time’<sup>3</sup> – firms’ innovation decisions are intentional – and purposeful – and hence forward-looking, while the perceived scope for innovation possibilities are contingent on the recent history of the firm – and hence backward-looking.

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<sup>1</sup> The term is Schumpeter’s own.

<sup>2</sup> The term ‘technological’ is conventional, but the argument has nothing to do with even extended conventional definitions of ‘technology’, unless it is interpreted in the abstract sense of the ‘logos of the functional activities and operations’ of the firm.

<sup>3</sup> This statement is basically a restatement of the Austrian economists Ludwig Lachmann’s statement on equating knowledge acquisition and [subjective] time.

The response ‘from the market’ is delayed – with the delay giving an inherent time unit that reflects the market incentive structure. This thus goes far beyond the simple sequential relation between the decision and its implementation

One hypothesis may however be suggested immediately. The structure of the orientation of innovations introduced in a certain market tend to reproduce dominant perceptions among agents of what the ‘hot spots’ in the market are – in what areas rewards and competitive positions may be reaped with the highest pay off. This hypothesis implies that the market-wide structure of innovations would reproduce major features of the agents’ dominant models or perceptions of the market.

Up to this point there should be no basic problems or disagreements. The problem comes in with the limitations and adaptations of this universe of small- and large-scale, small- and large impact behavioural changes to the questions analysts, policy makers, etc. raise. What limitations and adaptations are made vary according to the issues in question. Irrespective of the core research issue of what characteristics of innovations are distinguishing marginal from important, relevant from irrelevant, one lesson may be drawn immediately here; the distinction here between relevant and irrelevant innovations is a task for the analyst to make – not the economic agent. Utmost care must be taken if it is required that respondents to innovation surveys make the distinction.

Secondly, this approach does not restrict the ‘mode of innovation’ – firms consciously alter their behaviour in many respects, again shaped by their perceptions of the market incentives they are faced with. A mapping exercise focussing one set of fields of innovation<sup>4</sup> to the detriment of other fields may seriously skew the profile of innovations and hence the potential and impact for innovation across markets and sectors.

The core question then is, does the Oslo Manual approach to innovation, notably in the form of TPP innovations still hold up as a reasonable limitation to address the core objectives set out for the manual. We claim at least that there are significant ground for considering this question and through this critically evaluate the position on limiting innovation activities and the objectives addressed. Only in doing this may the Oslo Manual continue to form an important basis for future socio-economic innovation research and for raising issues of importance to innovation policy formulation.

## **A theory of the innovating firm**

What does a firm do when it innovates? What determines the orientation and extent of its innovation? During the last decades the insights into the answers to these and related questions have been extended considerably, not the least due to the initiative that was taken around 1990 to establish a framework for systematic mapping of innovation activities and the development of related innovation indicators. Since then socio-economic innovation research has expanded the sectoral basis for understanding innovation beyond the technology-intensive markets for manufactured goods that formed the basis for the initial work.

Innovation is about economic – techno- or socio-economic – behaviour at firm level – i.e. what a firm does in its role as an economic agent. Innovation is done by the firm to alter its position vis a vis its competitors, customers, suppliers, related companies etc. Hence innovations as changes in economic behaviour are intended by the firm to have an impact on its competitive position. The objectives underpinning the Oslo Manual have their prime focus on behaviour – on what firms actually do – and not on how or why they do what they do.

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<sup>4</sup> See below.



Nevertheless, innovation is more or less uninteresting if it is not seen within the context of a wider theory – of a theory about major characteristics and regularities of innovation patterns, of links between various framework conditions and innovation performance, of the structural and socio-economic impact – including productivity and income growth – of innovation activities, and so on.

A core position underpinning the Oslo Manual approach was the position on innovation theories that was at the base of the OECD TEP programme – that innovation has ‘systemic’ character. Innovation by firms are shaped in the interactive dynamics between the innovating firm and its structured economic environment. These interactive relations it was argued have persistent features that impact on the structure and orientation of innovation activities.

Though most of the implications of this position still elude us, almost all innovation research and policy analysis would simply be unthinkable without this position. The content of this position is that there are important inter-firm – and even inter-market – correlations between fundamental determinants of innovation, correlations that are persistent over time (hence over innovation dynamics).

On the other hand extensive research has shown us that though innovation in many respects is simple, in many other respects it is complex – complex to understand, to analyse and to provide supplementary incentives for. In fact, there seems to be so many factors and features shaping innovation performance that Leo Tolstoj’s *Anna Karenina* principle seems not just to apply to families<sup>5</sup>, but also to firms – successfully innovating firms are all innovating the same way, while every unsuccessful innovator and non-innovator is unsuccessful in its own way.

In general, questions about the relationship between firm growth and evolution, industry development and differentiation and its structural macro-economic effects are at the core of modern innovation analysis and theorising. As pointed out by Nelson 1996, the basis of much of this work is a resource-based theorising of the firm that finds many of its core ideas and assumptions in Edith Penrose’s seminal work. (Penrose [1959] 1995). These ideas are central to learning based approaches to innovation systems: learning processes are seen as instrumental for the ability of the firm to shape its own development and its environment so as to foster firm growth and industrial development.

But rather than start with the inter-firm relations any theorising of innovation determinants and activity performance has to start inside the innovating firm – with a theory of the innovating firm. Since the purpose is to provide a ground for general innovation analysis it is essential to focus on concepts and features that are general, and hence without detail. Since this author’s research interests are mainly on the meso- and macro-level structural impact of innovation activities there are no need for detailed realism in this model. An innovating firm – an innovator – has made a decision to change its behaviour. Depending on the scale, cost and expected benefits of the innovation, the decision making may be strategic or tactical, management or “shop-floor”<sup>6</sup>, radical or incremental etc.<sup>7</sup> The decision is made on the basis of the decision maker’s perceptions and expectations about the operation of the firm and its place in its market environment. These perceptions and expectations of the market

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<sup>5</sup> Leo Tolstoj, *Anna Karenina*, first paragraph, “Happy families are all happy the same way, while unhappy families are all unhappy in different ways”

<sup>6</sup> In a general, non-manufacturing sense.

<sup>7</sup> With emphasising the decision, we imply that the firm is faced with a choice between alternative behaviours – changes in behaviour with no choice to adapt to changed environments does not constitute innovation. Note however, that it should not be required that upholding previous behaviours is one of the alternatives.

environment, the objectives of the firms, the attitudes and reactions of its stakeholders, of what is seen as its core competences and capabilities, and so on, together form what may be termed the firm's local theory<sup>8</sup> of the firm and its environment, providing the basis for decision making. The decision making process is furthermore shaped by the rationalities of the firm, such as profit satisficing decision making, bounded (functional and market) horizons, etc. The local theory and rationalities, together with the information feedback from the market environment that is noted by the firm provide the basis for acquisition and transformation of information, from internal sources, but more importantly from external sources. The basic intra-firm innovation feedback loop may thus be depicted as the triangle shown in figure 1.

How may we conceive the structure of this local theory that this suggests is the proximate determinant of innovation? We will do this here by pointing to the role of competences and capabilities of the firm – these competences and capabilities provide a framework for the local theory, while the local theory provide guidelines for how these competences and capabilities are managed and developed. The relevant competences and capabilities – though dependent on external information and knowledge – are basically sticky and specific, intimately linked to the business operations of the firm.

The role played by the firm's intangible resources suggests that there is a decisive role for the firms' competences, skills and capabilities. Industrial development is to a large extent shaped by these 'competence bases', giving rise to firm specific dynamic trajectories or histories, and in this sense, they may be characterised as 'sectoral' or 'industrial' competence bases to industrial trajectories. The forces that shape such bases are then also important driving mechanisms for the long term development of industrial sectors.

Our focus is to characterise the nature of *change* in typical firm behaviour. If we turn to Schumpeter and the neo-Schumpeterian literature, three factors are usually claimed to be the central determinants of these changes,

- \* the existence of and ability to utilise *technological opportunities*,
- \* *market conditions and opportunities*, as well as
- \* the *appropriability conditions* for categories of innovations, contingent on technological, market and governance conditions.

The perceptions of these conditions and opportunities and changes in them are what are regarded as determining factors of industrial development. At the firm level, these conditions shape firms' learning processes and hence their subsequent capabilities. Adapting Carlsson and Eliasson's scheme for classifying *economic competences* (Carlsson and Eliasson 1995), we may distinguish five dimensions to these.

Economic competences are multi-dimensional, and have many-faceted impacts on innovative efforts. These competences and capabilities form the basis for 'economic action', towards innovation and towards business conduct. In defining economic competence as the ability to generate, identify, expand and exploit business opportunities, we may identify five types of capabilities:

- selective or *strategic* capabilities,
- *organisational* or integrative and co-ordinating capabilities,

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<sup>8</sup> The concept of local theories and their role in decision making is a central theme both in modern organisation theory and in social psychology. Cognitive structures as local theories, mental maps, schema and others are fundamental in shaping individuals and organisations behaviour and 'perceptions of the world'.

- technical or rather *functional* capabilities,
- understanding of and capabilities related to *market* and demand characteristics, and
- the capability to *learn*, integrating and cutting through all of these.

Here, and in figure 2, we have added a separate category of market and demand capabilities to Carlsson and Eliasson's original list, since these competencies are distinct from the selective or strategic capabilities in which these competencies seem to be included in the original scheme<sup>9</sup>. The five areas of capabilities point to three broad 'capacities' of the firm. The lower tetrahedron corresponds broadly to what has been termed *absorptive capacities* (Cohen and Levinthal 1989) in the literature, while the upper tetrahedron correspondingly form the basis of *emissive capacities*, the capabilities to signal behavioural characteristics to the market environment. Lastly the horizontal plane is the anchor of transformational capacities – capacities required to perform the complex task of sorting and transforming information, data and knowledge available inside and around the firm into the productive competences and resources that underpin the operations and behaviours of the firm.

These areas of capabilities differ in character and in intra-organisational distribution, and have often been focused on selectively in different approaches to competencies. While the innovation literature mainly focuses on functional capabilities, management literature has a stronger focus on organisational and strategic capabilities. Nevertheless, our contention is that all these types are complementary; it is the integration between these that forms the basis for dynamic capabilities. What all these capabilities have in common is that they emphasise the interaction between internal and external repositories, that these capabilities (see e.g., Cohen et al 1996) are constituted partly in routines, heuristics and skills, and that they have tacit dimensions.

These capabilities form the major background for firms to respond to and utilise the Schumpeterian technological, market and appropriability conditions; in short, they form the basis for how these conditions are transformed into firm behaviour. Thus these capabilities form the central link between technological, market and appropriability conditions and changes in firm behaviour; viz. innovation, as indicated in figure 2.

If we combine these two perspectives on the innovating firm we get a model of the innovating firm illustrated in figure 3. This figure fully illustrates both the simplicity of the basic structure of innovation activities and the complexity of the processes involved.

A core message of this model is that innovation is a market phenomenon; innovation finds its rationale and consequences in the nexus between the firm and the market environment. Any attempt to understand innovation and its micro-level as well as its structural impacts must start from this market perspective.

This has two consequences. Firstly, there should thus be no presumption about what inclinations – or fields – of innovation are relevant to the questions addressed, and which are not. Secondly, and unfortunately, we still know too little about the relation between implementation of altered behaviour by companies and the structural impacts of innovation. As this involves the process of diffusion – or perhaps better percolation – of new modes of innovative behaviours; how firms learn new behaviours from the market environment and adapt to new varied forms of behaviours, this has a direct relevance for innovation mappings. This involves important issues concerning the dynamic interaction and co-production of innovations in intermediate markets as well as the role of the firm as a bridge between up-stream and down-stream markets.

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<sup>9</sup> Foster 1986 forcefully describes the importance of functional, organisational and market capabilities and their distinctive and complementary relations.

However, the innovation map still includes vast white territories. Consumer markets and related dynamics are still weakly understood, similarly concerns various service-intensive markets. The limitations of the dominant paradigm of technological innovation becomes overwhelming when focus is given to industries where innovation does not conform to the traditional R&D model. We have almost no understanding of innovation in activities in environments where public organisations play a dominant role. The remaining part of this paper will start out from a perspective on innovation in and around service activities and firms. But as we will see, the issues raised are more general – relevant for all economic activities.

At the present time there are no viable alternatives for an innovation theory adapted to service firms<sup>10</sup> or firms where service dimensions play a vital role in the market dynamics. Hence care is needed in selecting core conceptual frameworks and approaches used to analyse innovation and structural change in and involving services. And when we see fit to alter the conceptual frameworks, investigate whether altered frameworks cast a different light on underlying axioms or their basis. It is not so much a question of whether the concepts and arguments that are used to analyse innovation, are wrong or not, but whether the concepts we use are analytically well honed to approach and understand economic development in the present era, in the context of the analytical questions we – as analysts – ask.

The innovation theories that have been used, inspired and implied by a range of general arguments of innovation and economic dynamics, have generally two core elements; innovation in service activities is dominated by dynamics external to the service production and supply itself, and there is a strong focus of technological innovation and related measures of productivity change. The basic conclusion of this paper<sup>11</sup>, is that these conclusions are misguided, basically for three interrelated reasons;

- innovation is ubiquitous also in services, but a focus of innovation in services raises a series of issues related to our present conceptualisations of innovation that have a validity beyond a consideration of service production alone,
- a sector frame on innovation studies, and in particular a quest for a single source or driver of economic growth, misses fundamental points about the constitution of economic *systems*. A system perspective is of fundamental importance to understand the emergence of both innovation and services,
- the role of various service functions in shaping and modulating innovation capabilities in client and supplier sectors is an important part of this systemic perspective.

To understand reflexively innovation in service intensive firms, i.e. the activities and decisions implemented at the level of the individual firm that cater for opportunities and challenges in the business environment of the individual firm, based on their perception of them, we need, as analysts, to approach innovation in a systematic way that reflects these firms' perceptions of their business activities and environments.

The lack of well founded innovation theories adapted to characteristics of service innovation has left the research community with applying 'standard' innovation theories with a

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<sup>10</sup> Some attempts have been made. Most noteworthy is Richard Barras' theory of innovation in services, organised around the concept of 'the reversed product cycle'. However this is a rather specific 'theory' with some weaknesses, at most limited to an attempted description of present ICT-dominated changes in information services, see F. Gallouj, *Innovating in reverse: Services and the reverse product cycle*, SI4S Topical Paper 5, STEP Group 1998.

<sup>11</sup> See also J. Hauknes, *Services in innovation – Innovation in services: SI4S Final report*, SI4S Synthesis Paper S1, STEP Group 1998.

conceptual basis in analysis of innovation in manufacturing, often high tech, industries and firms. However, in doing this, it is our claim that there is a lack of a critical consideration as to the applicability of the rooted concepts and basic foundations that are used for service innovation across the board. We believe that the consideration of innovation in a variety of service industries casts serious doubt about a general applicability of this basis. Analysis of service innovation raise the need of reconsidering some of the core aspects of these innovation theories.

Our particular interest here is not innovation theories per se, applicable to or developed for services in general, but rather the empirical mapping of innovation activities and their impacts on firm level. The Oslo Manual should be seen as an attempt to synthesise and standardise up to date understanding of innovation in business firms, without relying on any specific analytical perspectives of individual theoretical approaches, and adapted to the purposes of mapping innovation activities in a survey format. With the Oslo Manual as a 'consensus' framework of mapping innovation in business firms, the question is whether the concepts and models underpinning the Manual represent a relevant triangulation of innovation in business firms, given the Manual's objectives, across industrial sectors and markets. This is, unfortunately, not the case.

To substantiate these claims we designed a survey of innovation in service firms that approached innovation activities in a way that reflected these considerations. The aim of this paper is not to present the results of these surveys and similar surveys performed on the same basis. Rather this is an attempt to discuss the rationale behind the survey instruments used, and the major differences between our approach and the standardised Oslo Manual approach. A crucial emphasis in our approach was to design survey instruments in a way that service firms could readily recognise and that captured the multi-functional character of the activities we choose to call innovation. We will start our discussion with the characteristics of the Oslo Manual approach to innovation, and outline why we need a more nuanced approach to innovation in services.

## **TPP innovations - The Oslo Manual and CIS approach to innovation and services**

The first innovation surveys were restricted to manufacturing industries, focussing technological product and process innovations, a functional specification of inputs to such innovation processes, a delimitation from 'back-office' and organisational innovations and share of total sales accounted for by new or significantly changed products as the only quantitative measure of the output of innovation activities. The manufacturing bias of the Oslo Manual and the subsequent surveys that were based on it was reflected also in the conceptual framework of the indicators used to describe innovation activities and outputs. Even though interest at the time was marginal, there were some attempts to extend the apparatus to service sectors. Within CIS I this was reflected in the Dutch and German surveys, where some service sectors were included, albeit in a way that was a more or less direct application of the Oslo Manual framework to service sectors. In the period 1992-1996 other attempts were made to develop innovation survey formats more adapted to characteristics of innovation in service sectors. These attempts are described and discussed elsewhere<sup>12</sup>.

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<sup>12</sup> J. Hauknes 1996 and J. Hauknes 1998, *op.cit.*

## The CIS rationale for measuring innovation

The rationale for performing such surveys are stated very cursorily in the two editions of the Oslo Manual. Evidently the strong impetus to develop the manual is coming from policy analysis. The work is intended as a substantial contribution to what is seen as a major obstacle to informed policy formulation, the lack of output measures and indicators from R&D and innovation efforts<sup>13</sup>. Secondly, it is emphasised that “our understanding of the innovation process, and its economic impact, is still deficient [where] success in refining the analysis of innovation, and in tackling the policy problems it poses, will depend in part on the ability to improve” information on innovation<sup>14</sup>. Lastly the issue of international comparisons and statistics methodology is raised, there is a strong contention that present economic statistics apparatus does not address technological change and innovation as main drivers of economic change properly. For all motivations and aims there is a recurrent emphasis of the lacking state of present understanding of innovation and mapping methodologies, implying the broad need of surveys being explorative.

Broadly we may thus identify three categories of motivations for CIS,

- a strong policy motivation for CIS and the Oslo Manual, the purpose of innovation surveys being to contribute to a knowledge base conducive to the formulation of industrial policies aiming at enhancing innovation performance, and
- explorative and research oriented objectives, to experiment with mapping methodologies and to develop basic data for further research into innovation processes and impacts,
- analytical and statistical motivations to develop mapping methodologies and to map industrial change and innovation across nations.

However, there is a suggested priority given to the former two of these, the needs of innovation indicators “of policy makers and [innovation] analysts are a paramount consideration”<sup>15</sup>.

The EUROSTAT Harmonised questionnaires based on the Oslo Manual have the status of being a ‘recommended’ questionnaire for the surveys, run by national statistical authorities in member countries. Below we will give a brief outline of the main aspects of the approach of the revised Oslo Manual to innovation in services.

## The innovation concept

All core questions of the CIS II service questionnaire, with some minor adjustments, are included in the CIS II manufacturing questionnaire. The main differences between the two questionnaires were two,

- the use of the summed category of *service innovations* when addressing service firms to replace the distinction between *product* and *process innovations* used towards manufacturing firms,

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<sup>13</sup> It is somewhat of a paradox given this to note that apart from the share of sales indicator for product innovations, few attempts have been made to systematically experiment with and assess alternative impact and output indicators. The major share of core CIS indicators are input and flow indicators.

<sup>14</sup> OECD/Eurostat, *op. cit.*

<sup>15</sup> *loc. cit.*

- the inclusion of an additional set of two questions on impact of product innovations, in the latter. Manufacturing firms were asked to give shares of annual turnover in turnover from resp. unchanged, improved and new products. Furthermore these firms were requested to identify a degree of novelty of innovations, whether innovated products were ‘new to the market’ in addition to being ‘new to the firm’, and if so what share of turnover these ‘new to the market’ innovations corresponded to.

We will first address the content and structure the basic definitions in the questionnaires. The definitions provide the main outlines of the basic concepts to the respondents. Respondents are however provided with a supplementary explanation, in the form of a list of “examples of technological innovations”, evidently to aid respondents’ interpretation of the basic concepts. Hence we may interpret these lists as exemplars of the model innovations the authors of the Oslo Manual and the CIS harmonised questionnaires had in mind.

As noted above, the Oslo Manual and the CIS survey were originally designed to address innovation in manufacturing industries. With a strong hereditary line between the first and the second edition of the Oslo Manual, it is evident that the extension of the basic concepts to cover service industries must be seen as an attempt to extend the basic approach that were chosen for the first edition to encompass what were regarded as requirements specific for service industries<sup>16</sup>.

As argued above, a significant motivation for the Oslo Manual/CIS exercise is exploratory. The immediate question is then if the evolution of OM/CIS from 1992 to 1997 reflects this, how are the explorational aims tackled in the second round? With the OM/CIS approach playing the role as an ‘industry standard’ for innovation surveys, the definitions used are important determinants of how the phenomenon of innovation in business firms is understood and how the related concepts are used, in analytical studies of innovation and in policy-oriented work.

### *Technological innovation*

From the start the Oslo Manual has been a manual for measuring *technological* innovation. This focus of technology reflects its wellspring – the Oslo Manual grew out of initiatives and work for indicator development during the OECD Technology/Economy Programme during 1989-1991, strongly linked to the policy orientations and objectives of the TEP programme. Technology in the wide sense was intended to capture both hardware and software aspects, as well as including productive knowledge, or production capabilities, more generally. In the first edition of the Oslo Manual<sup>17</sup> there is no discussion of the concept of ‘technology’. It seems that ‘technological innovations’ were treated as more or less synonymous to product and process innovations, with an implicit definition hidden in the references to literatures on technological change and economic growth. An explicit reference was made to Joseph Schumpeter’s five-tier suggested outline of what his concept of innovation encompassed, viz. product and process innovations, opening of new markets, capturing new sources of supply

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<sup>16</sup> See the introduction of the second edition of the Oslo Manual. This choice reflects that experiences with the methodology in CIS I were generally considered positive. The technological product/process innovation approach had worked satisfactorily, with experiences laying the foundation for an incrementally improved methodology for the CIS II, “the original framework of concepts, definitions and methodology [is updated] to incorporate survey experience and improved understanding of the innovation process”.

<sup>17</sup> OECD, *op.cit.*

and re-organisations of industries<sup>18</sup>, “these guidelines will deal only with the first two, new products and new processes, *which are technological innovations proper*” (our emphasis).

The second edition, cf. OECD/Eurostat (1997) is more explicit here, both in noting the inherent semantic uncertainty of the term, especially when used in a multi-lingual context, and in terms of outlining an analytical framework for the Manual<sup>19</sup>. On the issue of mental and theoretical models of innovation used, the authors of the Manual stress correctly that since innovation is a complex, diversified activity, a mapping exercise through a survey necessarily must be selective. They argue that the Manual is not based on any definitive model of innovation – implying that the chosen approach must have a concept of innovation general enough to be applicable across a range of theoretical models.

However, still in the second edition recourse is made to technological innovations as essentially consisting of joint product and process innovations, but now with the additional inclusion of technological ‘delivery methods’ under process innovations, again “this manual concentrates on two of Schumpeter’s categories, **new and improved products and processes, with the minimum entry set as ‘new to the firm’**” (emphasis in original), this time supplied with an interesting justification, this is done “in order to take in the recommendations on diffusion” (p 43).

This justification evidently refers back to a preceding brief outline of the role of diffusion in generating economic impact beyond the limits of the individual innovating firm. The implied hypothesis is that innovation activities generates wider economic impact through a process whereby technological product or process innovations are diffused, adopted and imitated by other firms. These TPP innovations are thus seen as the major vehicles for why “innovation is at the heart of economic change”.

We note the frequent referral in definitions etc. to objective characteristics, performance and use of technologies in identifying these innovations. As is evident from the discussion in the Oslo Manual the designers of the manual and the questionnaire have struggled to find an approach that allows the surveys to address what is perceived as objective, or hard, innovations.

The objective is to describe and measure innovations that are in some sense real, or ‘visible’; these are what we may denote ‘alienable’ or objective innovations. Being alienable they can be described and reproduced; these are codified innovations easily exposed to imitation. For later reference we also note the absence of any discussion of the concepts of ‘products’ and ‘processes’; the two are taken for granted.

### *Innovation in the Oslo Manual*

The authors of the Oslo Manual and Harmonised questionnaire have imposed three restrictions on what is considered as (technological) innovations;

- *degree of novelty*, innovations are required to have a significant degree of novelty. However, the operationalisation of this requirement is evidently left to the respondents,
- innovations to be considered are delimited from changes in characteristics of ‘*ancillary service*’ products. TPP innovations in ancillary services cover only process

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<sup>18</sup> Schumpeter’s concern was generally not organisational and behavioural change in firms, his focus of radical innovations was motivated by a concern for dynamics at the level of industrial organisation.

<sup>19</sup> OECD/Eurostat, *op.cit.*



innovations in ancillary activities, from the example given process innovations that involve introduction of capital technical instruments or tools, “the computerisation of the sales or finance department may be considered a TPP innovation”<sup>20</sup>,

- and as already noted there is an explicit exclusion of *non-‘technological’* (attractivity-enhancing), *‘aesthetic’* or *‘subjective’* changes in characteristics and qualities.

It is assumed that innovations in the sense of the Oslo Manual have a unique cardinal degree of novelty where it is meaningful to operate with a cut-off distinguishing significant and non-significant degrees of novelty. This is a characteristic that evidently resides with the objective characteristics of the product or process. Novelty is seen itself to be a derived objective characteristic, derived from the objective technological characteristics of the product/process in question. Though the definitional outline of innovations is somewhat unclear concerning the status of organisational changes (see below), a cardinal degree of novelty is difficult to operationalise for organisational changes other than in exceptional cases. The novelty criterion further strengthens the hard, alienable approach to innovations that is emphasised by focussing objective characteristics.

An interpretation the authors of the Oslo Manual probably should subscribe to would then be

- (1) innovation in ancillary services are secondary (mostly cost-minimising) phenomena, both from the point of view of the external observer and of the firm that are generic towards individual products/production processes, with no or weak links to the specificities of these, hence
- (2) ‘visibility’ and degree of novelty are generally difficult to operationalise for these innovations, and
- (3) general in-alienability of these innovations imply non-codifiability and inimitability and hence both difficulty in identifying and describing them.

The basic problem with this interpretation is that these assumptions are unverified, and even to a large extent even unverifiable. There are also substantial reasons for believing that such an assumption involves a substantial misrepresentation of innovative behaviour in many industries.

The combined Oslo Manual and CIS approach is based on a blue print model of innovation, a model that is based on an engineering based, production workflow approach to industrial production. The attempt is evidently to identify physical, or technological, processes, rather than the organisational and behavioural processes underpinning innovation. There is an implicit assumption of a one-to-one mapping between technological, flowchart outlay of production processes and their results, and organisational actions. Then innovation may be analysed with a hard engineering approach to innovation opportunities and objectives, defined as technological characteristics.

This engineering approach is further substantiated as the framework of analysis through the definition of innovation activities and related expenditures. Innovation activities are “all those *steps necessary to develop and implement* technologically new or improved products or processes” (our emphasis), with innovation expenditures identified as the incurred costs of these activities.

### *The CIS Harmonised Service Questionnaire*

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<sup>20</sup> These innovations were included in the revision process of the Oslo Manual, the first edition excluded innovations in ancillary activities altogether, “as [innovations in production process and/or products] alone result in new products or processes. Hence the *computerisation of the sales or finance department should not be considered an innovation*”.

The Oslo Manual uses the product/process distinction indiscriminately across the division between manufacturing and service sectors, though the Manual notes that this distinction may be difficult to apply in *some* service industries. However, when the Harmonised Questionnaire was designed by EUROSTAT, a separate questionnaire was designed for use towards service firms where technological innovations were lumped together into a single category of *service innovations*, evidently out of concern for the possible indistinguishability of product and process innovations more generally<sup>21</sup>. But apart from this alteration, and the concomitant exclusion of core questions on share of sales from changed products, the definition of and approach to technological service innovation are essentially repetitions of the general definitions, so the same comments apply here. However, we note that technological innovation is defined without the explicit requirement cited above of “an *objective* improvement in the performance ...” used in the questionnaire for manufacturing firms.

Following the general definition of technological innovation as “implemented new or significantly improved services and new or significantly improved ways of producing or delivering a service”, this requirement is replaced by the a supplementary formulation, “A new or improved service is considered to be a **technological innovation** when its characteristics *and* ways of use” etc.(our emphases in italics)

This must be interpreted as an *inclusive-or* (i.e. at least one change in the combined set of characteristics and ‘ways of use’). But then the formulation used is at best badly chosen, leading to greater, rather than smaller, uncertainty of how respondents interpret these core questions.

Note further the use of examples as a way of delineating the concept of technological innovations. All examples but one in the CIS questionnaire have an immediate and prominent IT-dimension, the IT involvement is a central constitutive feature of the innovation. What this list suggests to the respondent is that innovation in services is (primarily, if not solely) about the introduction of advanced IT-based tools and systems.

Agreeably, ICT is important for innovation in many service sectors and firms. But the list prompts the questions of whether this ICT bias is warranted or accidental, and if it is the intention to restrict ‘characteristics’ to IT characteristics, what the basis for doing this is. To start with the latter question, there are no convincing reasons to restrict ‘innovation in services’, even within the TPP innovation framework, to neither advanced nor more routine IT-related innovations. This does not bar that they are important and maybe as important as this suggests. However, this is still an open question.

As to the intentions of the authors of the questionnaires and the Oslo Manual on the role of IT in service innovation, the discussion in the Manual on p. 17-18 suggests that this is not intended. The discussion is not concerning IT directly, but is an attempt to discuss the interpretation of the technological dimension of TPP innovations. Noting issues such as semantic variation of the term ‘technological’ across languages and “overtones of the word to which respondents may react”, “it was felt that in service industries ‘technological’ might be understood as ‘using high-tech plant and equipment’”, which was evidently not the intention. Thus there is a considerable gap between the underlying intentions of the Manual concerning the interpretation of TPP innovations and the implied definition that is provided by the service questionnaire.

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<sup>21</sup> I argue elsewhere that there are *no strong arguments against making a product/process distinction* in service sectors. The problem with such a distinction in most cases is the elaborated ‘engineering’ meaning of the product and process concepts that is built into the analytical use of the pair, and not the pair *per se* or the market-contextualized use of the pair.

### *A blue print approach*

The key to understanding the existence of this gap lies in the Manual's understanding of 'technological' product and process innovations. The distinction between 'technological' and 'non-technological' innovations implies that a rift is being made between the 'objective' characteristics of the considered product on the one hand and the services provided, the utilities, by the product to the consumer or user on the other hand, *and* that we are forced to regard these provided services as either remaining inert or coming into existence as new and autonomous wants/services. In making a distinction between 'technological' novelty and what is termed 'other improvements', the Manual (overly) emphasises 'performance characteristics' as the distinguishing concept.

The authors of the manual note that such a distinction implies that various industries are treated differently, due to variations in the applicability of this simple distinction. Thus we would expect some nuanced discussion of such 'creative improvements' in contexts where they are important, followed by an outline of important limitations in the applicability of the chosen approach and of the data that the approach generates. This is not the case. When facing the difficulties in approaching these 'other creative improvements', the reader being pointed to a separate section identifying these, the manual reverts to a simple discussion of "improvements in products [sold directly to consumers or households] which make them more attractive to the purchasers" (p 57), evidently a subclass of the residual implied by the discussion above. This restricted set of improvements is dismissed from the class of TPP innovations. This section states three types of these 'other creative product improvements'; in each case counterposing these with TPP innovations from the same context. Changes in colour and cut in clothing "do not change the *essential* characteristics" (our emphasis) of the product, TPP innovations involve the use of new materials. Introduction of on-line booking in travel services are TPP innovations, while "package tours with new themes" (incl. to new sites?) are not. Restyling a restaurant is outside, while introduction of micro-wave ovens is inside the set of TPP innovations.

### *Limitations of a blue print approach*

It is evident that a key aspect of the approach of the Oslo Manual approach is the distinction between what is described as *objective and essential* characteristics of the product, process or delivery method in question and what is termed *subjective* characteristics, characteristics of the utilities generated or the wants satisfied by the product/process, non-TPP changes in products and processes "does not concern use or objective performance characteristics ... but rather their aesthetic or other subjective qualities". TPP innovations are identified with changes in the 'objective' characteristics, while innovations that involve changes in these 'subjective' characteristics are excluded.

Hence the Oslo Manual approach has severe problems with the core dynamics of many consumer markets – where exactly such 'subjective' characteristics may be significant, and even dominant aspects of the innovation dynamics. In this context the point made above of the relation between agents perceptions of the determinants of competitive advantage – and hence of remunerative innovations and the structure of realised innovations should be noted.

This approach does not represent products and processes *qua* economic goods and their production, i.e. innovations understood as changes in business characteristics<sup>22</sup> of these. Only in the case of what is traditionally conceptualised as 'commodity products' may objective

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<sup>22</sup> Business characteristics encompass economic characteristics, viz. functional (what needs fulfilled) and exchange properties, and immanent properties, as technical, of the respective products or processes.

characteristics serve to describe such products fully. Then (TPP) innovations are readily identifiable and are diffused in the economy as ‘archetypes’, as ‘blue prints’.

A substantial limitation with the Oslo Manual, and hence with the CIS questionnaires, is that it does not discuss the relation between various definitions of innovation and innovation activities and overall objectives of the manual and surveys as CIS. In the first part of this section we identified three sets of overall objectives, though neither of them are clearly specified as the major objective. Hence there are no substantial argument presented for why TPP innovations should be chosen as sole focus. Furthermore as we have outlined here, the definitions seem to be basically flawed as they start out from a limited perspective of a simple distinction between ‘objective’ and ‘subjective’ characteristics of products and processes.

The point we make here is that only with a proper discussion of the relation between objectives and definitions will the manual be able to relate what kind of analyses the resulting data are adapted to, and what their basic limitations are in that respect. In the manual we may broadly identify two types of arguments for the restriction to TPP innovations. One set of arguments for the exclusion of other forms of innovations is used several places, most notably in discussions of organisational innovations, and points to deficiencies or crudeness both of statistical methodologies and of our present knowledge about the constitution and dynamics of these other innovations. Due to these aspects the present methodology does not allow measurement of other forms of innovation.

Such arguments imply that we would expect the manual to argue for *an explorative approach* to these other forms of innovation, their dynamics and their role in generating industry- and economy-wide effects through diffusion and other spillover mechanisms. If this is the main argument we are thus led to question the validity of the claim that TPP innovations are the main vehicles for generating such effects, and hence the whole program of policy supporting analysis that the manual and surveys purports to allow. Under these circumstances the core objectives of such surveys would be their role as to guiding analytical and methodological exploration, in which case the manual ought to have a clearer profile in outlining a research agenda for the area of innovation studies. Criteria for international comparability may in such a context be counter-productive, rather than the opposite.

On the other hand it is also argued that TPP innovations are the main vehicles of generating economy- or industry-wide effects of innovation, as wider productivity growth etc. The problem is that the manual *lacks a reasonably extensive discussion of this claim*. When highlighting the policy supporting role of such innovation surveys the claim that TPP innovations are the dominant mechanisms for generating overall growth of economic productivity, employment and welfare implies that innovation diffusion and the complementary firm-level learning processes are dominated by adoption, adaptation and development of TPP innovations. *As a general claim across all industries and market structures, this is highly questionable*.

The consequences of this is that the framework proposed in the Oslo Manual and operationalised in the CIS questionnaire probably has limited validity across industries, and with an uncertain status as to the foundation it furnish for formulation of industrial innovation policies.

These problems raise issues that are fundamental to the future development of the innovation survey instruments, issues that the Oslo Manual and the CIS have not addressed properly. It is important that these issues are addressed in the further planning and revision process within both EUROSTAT and OECD.

## Outlining innovation in services

Our present understanding of innovation is as we have seen primarily an understanding of manufacturing TPP innovation. Rather than immediately drawing the conclusion that service firms are generally weaker innovators than manufacturing ones, we should ask whether our approach to the phenomenon of innovation leads limits our understanding of the change processes and strategic opportunities on service markets. Let us note that it is easy to acknowledge several areas of significant innovations in various services sectors, some examples are noted in the adjacent text box. The question we have to ask is if the Oslo Manual TPP based approach allows us to describe service innovations and their diffusion and adoption processes faithfully.

We cannot give the final answer to all the issues that are raised here. Hence, the suggestions made here are not a more ‘correct’ approach than the Oslo Manual/CIS approach, but rather an explicit attempt to explore issues as those we raised in the preceding sections. We believe that it has given some new insight that will prove valuable for the further extension of the Oslo Manual/CIS approach.

### ***Some classes of service product and process innovations***

*Trade:* Formats and formulae in retailing, automated inventory

*Transport and logistics:* Containerisation, third party logistics, aircraft & system

*Financial services:* Derivatives, share funds, database management, internet banking

*Consultancy services:* Intangible asset valuation, rapid design and prototyping, environmental impact analysis

*Telecom services:* Cellular telephony systems, broad band ISDN

*Broadcasting services:* Frequency modulation, pay-per-view

*Health services:* Prophylactic medication, screening techniques

*Other services:* Surveillance systems, strategic games, pattern recognition

## The starting point: Innovation blue prints

A fundamental aspect of what we may learn from service innovation – with implications for a wide range of types of innovations – is the necessity of venturing beyond view of ‘innovation as substantive events’ underlying the technological innovation approaches. However the immediate consequence of a richer concept of innovation is a less clear cut and more diffuse view of innovation, while allowing a better understanding of the dynamics of product markets and production. It reiterates and strengthens the basic character of innovation as *market phenomena*. Innovation is fundamentally shaped by market opportunities and challenges, as perceived by the innovator, and must be regarded as a deliberate response by the innovator to these opportunities or challenges<sup>23</sup>.

<sup>23</sup> Lest this be read as a denial of innovation in non-market activities, this may be re-phrased to a market-independent form, where incentive structures, aspects of governance and perception of challenges and opportunities are the relevant factors.

The objective notion of innovations, as contrasted to a process view of innovation, implies a 'blue print' approach to innovations. Innovations are limited objects that may be described by demarcated changes in objective performance characteristics, or the setting up of new such performance characteristics.

The point is not that this approach is wrong or misses the main points of innovation. In fact there is a very good reason for these criteria, intentionality of decision making, degree of novelty in performance and of objectivity of product and process innovations. Together they imply concise requirements for information signals to competitors, customers and others. Information about innovations is thus capable of being transmitted between agents, hence a blue print may be adopted by competitors, i.e. the innovation is imitated, the information in the blue print may change demand conditions on the market or in the industry and the customers' own innovative performance, or the blue print may be adopted by an agent in another industry or market. In short blue print innovations are strong vehicles for externality generation, the existence of the blue print pattern on the market changes the market environment where ultimately successful blue prints are described as diffusing over the market as they are adopted by competitors or customers. But note that these blue print externalities are just a subset of the externalities that may be generated by innovating firms.

This blue print approach is particularly well adapted to markets where there are objective product and process concepts, especially to markets where products are material and characterised by discrete, and often limited, sets of market relevant performance and functional characteristics. Though difficult to find explicit definitions, these seem to be core characteristics of 'commodities', hence we will also refer to this as the commodity-based approach to innovation. As performance characteristics become more diffuse, and intangibility of products increases, this blue print model becomes less clear cut. For f.i. information or 'knowledge' (intense) products, where the product to a large extent is constituted through the information it includes and where 'objective performance characteristics' are closely related to reliability, adaptability (for the client) and otherwise quality of the supplied information, a blue print approach quickly becomes less applicable. It is not that there are no product concept available on the market in question, but the characteristics of this product concept<sup>24</sup>, see also below.

The content of the innovation concept must be adapted to the intentions of the innovation analyst, in addition to the characteristics of the object of study. If the intention is to analyse the development of firms and specific markets, a wide definition is needed. An industry level analysis with a focus of structural characteristics of the industry in question may allow for a more restricted innovation concept, while an analysis focussed on economy-wide growth and development may be able to restrict the concept even further by considering the range of the diffusion or adaptation process. The CIS approach does not argue its case sufficiently even for the latter type of analysis.

### **In need of a wider innovation concept**

Therefore we have chosen to approach innovation from a fairly wide ranging perspective, to avoid undue limitations being imposed from the outset that could disallow a more considerate analytic specification to be implemented later on. This incurs somewhat of an anthropological approach, based on the firms own concepts corresponding to the analytical concepts of innovation, products and processes. In the survey exercises of innovation in service firms that

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<sup>24</sup> Even more so in market services as has been the focus of the SI4S project, it should come as no surprise that firms generally have a well-developed conception of its product, tied up as it is with the regard for 'what business the firm is in'.

were performed in three European countries, see in particular Sundbo and Gallouj (1998)<sup>25</sup>, we attempted to implement this wider perspective on innovation by avoiding the use of ‘innovation’, and basing the survey of respondents’ own concepts of products and processes of producing these products. To describe innovation in a neutral way with the intention of avoiding self-censoring by respondents, innovations were described as the implementation of decisions and actions taken by the firm that involved *significant* changes in the firm’s products, production methods, internal organisation and external relations.

This corresponds broadly to a simplification of a layered approach to describing fields or loci of innovation, cf. table 1 below. By describing innovation processes in terms of a multi-layered structural model of the firm we may identify five broad categories of innovation and innovation capabilities that are involved. As is seen from the table, the taxonomy is based on a layered ‘value chain’ approach to a firm, as consisting of integrated production and information flows. The first two layers concern production flows, while the following ones concern different aspects of information flows and the integration between these and production flows. As such they concern to a more direct extent than the former layers strategic management issues and the design of firm intelligence.

The first two layers of product and process innovations is what would correspond broadly to the intentions of the Oslo Manual description of technological product and process innovations. The third level includes issues as process innovations in supporting or ancillary, functions, as well as organisational changes related to these and to the implementation of product and process innovations. The fourth level concerns issues as implementation of new principles for the organisation of the firm, processes that may involve things like business process re-engineering, the introduction of concurrent engineering, quality assurance methodologies etc. Both the nature of innovation within each layer and the interaction between the layers would be expected to vary according to characteristics of the innovator’s activity.

#### *Systemic innovation*

As the outline in the preceding section makes clear innovation performance by any individual firm is dependent on a multitude of information sources in the firm’s environment and the linking of these to internal repositories of competencies. In a natural way this paves the way for a systems dependence of innovation. The interfirm divisions of labour that is evident in any economic system points directly to the crucial role of user-producer links, reinforcing the market dimensions of innovation. The institutionally structured environment of a firm or of a group of related firms is what has been denoted the system of innovation of the firm(s).

A constitutive aspect of this system is information flows, successful innovation is dependent on searches for, and transfer and interpretation of information on demand characteristics, on competitors’ actions and innovations, on applicability of externally developed information and knowledge on functional aspects of the business, or opportunities and challenges offered by such information, on wider social trends, how they may affect future demand patterns, etc. A fundamental starting point for analysing innovation at a level beyond an individual firm, is that an institutionally structured environment of firms is shaped by multi-functional and multi-institutional complementarities; innovation systems are a conceptual bridge between evolving ‘technical’ divisions of labour and innovation<sup>26</sup>.

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<sup>25</sup> J. Sundbo and F. Gallouj, *Innovation in services – SI4S Project synthesis Work package 3/4*, SI4S Synthesis Paper S2, STEP Group 1998

<sup>26</sup> J. Hauknes, *Dynamical innovation systems: What is the role of services?*, in M. Boden and I. Miles (eds.), **Services and the Knowledge-Based Economy**, Continuum, London 2000

**Table 1** Five layers or fields of innovation<sup>27</sup>

| <i>Innovation field</i>   | <i>Innovation locus</i>  |
|---|--|
| <b>Product characteristics</b> ( <i>product innovation</i> )                        | Capabilities and competencies involved in the design and production of products                                      |
| <b>Production and distribution process capability</b> ( <i>process innovation</i> ) | Capabilities and competencies involved in the design and operation of production and distribution processes          |
| <b>Administration process capability</b> ( <i>organisational innovation</i> )       | Capabilities and competencies involved in the design and operation of information and coordinating processes         |
| <b>Innovative business capabilities</b> ( <i>structural innovation</i> )            | Capabilities and competencies involved in strategic and knowledge management and competitive transformation of firms |
| <b>Relations management</b> ( <i>'market' innovation</i> )                          | Business intelligence and market research  |

*Innovation – Markets and interaction*

The macro-trends involving service industries in advanced economies today (Hauknes (1998)) are broad patterns and subject to considerable diversity. However, a general feature that underlies these trends is enhanced awareness and increased efforts of a large number of service firms and industries to find new ways of interacting with their customers and to adapt to what is perceived as a rapidly changing business environment. We have observed and mapped considerable efforts towards these ends at firm-level in a wide cross-section of service industries. There is now evidence that the service firms and sectors are increasingly becoming the sites of deliberate attempts to innovate; to improve the cost efficiency and quality of service production and products and to develop new service concepts.

Now these trends are not specific to service industries, they also apply to many manufacturing industries, even to mature and often 'low tech' in the OECD sense, manufacturing industries (Hauknes (2001)<sup>28</sup>). The systemic and interactive dimensions of innovation place increasing emphasis on the distributive powers of national innovation system, as well as on the absorption or reception capabilities. More intense competitive environments of firms lead to increasing demand for capturing, processing and transforming specialised capability-enhancing information and competencies. These processes lead to the emergence of 'knowledge' markets, allowing individual firms access to the competencies and capabilities of specialised business service firms<sup>29</sup>. These 'knowledge intensive' business service suppliers act as bridges or converters between external and internal repositories of knowledge, interfacing between sources of information and codified knowledge external to the relation between the supplier and client, the supplier's competencies and capabilities in utilising these, and the client's localised competencies.

<sup>27</sup> J. Hauknes, *Services in innovation – Innovation in services: SI4S Final report*, SI4S Synthesis Paper S1, STEP Group 1998

<sup>28</sup> J. Hauknes, *Innovation styles in agrofood production in Norway*, in OECD (2001) *Boosting innovation - cluster innovation performance and innovation policy*, P. den Hertog, E. Bergman and D. Charles (eds.), OECD Paris

<sup>29</sup> Hauknes (2000) *op.cit.*



## Delimiting innovation in services

Innovation is widespread in services, as it is in manufacturing. However, it is evidenced that the concepts of innovation as developed on the basis of analyses of manufacturing industries are not directly applicable to service sectors. It has become abundantly clear that a restricted technological product and process innovation approach must be extended to cover the interactive user-producer relations present in many service markets<sup>30</sup>. As suggested above, this is related to a lesser constitutive role of ideal production processes and products in giving structure to ‘service intensive’ industries, than in manufacturing (commodity) production. In ‘servicing’ relations the product is not perfectly formatted, or precisely determined; client interaction involves a co-producing relation that implies that for transactions where ‘servicing’ aspects are strong, each transaction is in a sense unique, adapted to client-specific circumstances. However, it should be evident that the degree to which this is the case varies, these relations are not solely located in transactions of ‘service’ products.

In contrast to the ‘mass production’ picture, the ‘service’ picture does not allow similar simplifying concepts of innovation processes as the blue print approach we argued was a central ingredient of the Oslo Manual approach to technological product and process (TPP) innovations. Broadly speaking we may follow Schumpeter to identify the act of innovating by a firm as the introduction of “any ‘doing things differently’ in the realm of economic life”, the carrying out of new combinations of factors of production. For obvious reasons this is a more extensive concept, in a functional sense, of innovation than the Oslo Manual TPP innovations.

We emphasise that any characterisation of innovation as technological or non-technological, product or process innovations etc. must be subordinate to the basic aspect of these kinds of innovation. Innovation is a market phenomenon, where its nature and dimensions are shaped by the perceived structure of competition on the markets where the innovating firm operates. Innovation from the firm point of view is primarily a (reactive or proactive) response to the firm’s competitive environment. By innovating the firm contributes to changing the ‘data’ of the business environment of customers, competitors and other related firms, requiring innovative responses from these, and so on. This induced generation of collective activity by what has been termed ‘technological’, defined residually as non-price, competition, is at the heart of the present understanding of innovation, its system dimensions and economic development. If anywhere, the engine of economic growth reside in this innovation driven generation of economic variety; as Schumpeter states “innovation is the outstanding fact” of economic development.

From this it should come as no surprise that service firms innovate extensively. This concept of innovation may be applied to any industrial activity, irrespective of the nature of the industry or product notions. Applicability of a further specification of innovation categories requires an adaptation to characteristics of the industry. Now, there are three dimensions that implicitly underlie the concept of innovation as generator of economic variety; innovations are *deliberate* implementations of ‘new ways of doing things’, innovations are ‘new’ or *novel*; they exceed some minimal novelty ‘height’, and they are at least partially *codified*. The essential point to note is that these three characteristics are more or less directly satisfied for the ‘blue print’ approaches to innovation discussed in the last section. It is outside this restricted class of innovations that these criteria are less immediate.

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<sup>30</sup> Cf. J. Sundbo and F. Gallouj, *op. cit.*

Other material gives a broad discussion of former attempts to conceptualise and interpret innovation in services<sup>31</sup>. The larger part of the existing literature in innovation in services have a technology-industrial perspective on innovation, concentrating almost exclusively on technological innovation in the restricted sense. Such approaches exclude ‘co-producing’ innovation processes that have been argued to be central for client intensive ‘servicing’ relations; innovations may “exist where the ‘technologist’ gaze perceives nothing”.

Central to many of these service oriented approaches is that the intensity of the relation between service supplier and client implies possibilities of service ‘product/process’ innovations that goes beyond TPP innovations. It is for these client intensive servicing relations that the product/process distinction in an objective sense is particularly problematic; broadly speaking the relation between supplier and client may be characterised as posing a production capacity or capability at the disposition of the client. Integrative approaches comprise attempts to devise general approaches to innovation, irrespective of divisions of service and manufacturing goods.

Here the general idea is that innovation involves generic features across divisions between services and manufacturing, or between tangible and intangible products. The importance of these features depend among other things on the characteristic intensity of interaction between suppliers and clients on the markets in question, leading to a possible description of an innovation landscape in terms of a continuum of relation and/or product characteristics.

## **Attitudes and modes of service innovation**

### *Attitudes of service innovation*

We have noted that in general service firms have a well developed product approach to their industry or markets. On the basis of this we may distinguish between *attitudes* and *modes* of innovations. Attitudes characterise the ‘functional space’ of the innovation, we may distinguish between product and process innovations, organisational innovations and market innovations, as indicated in the previous section. In identifying product innovations, the product concept of the individual firms is taken for granted, as this concept in much more detailed way reflects the structure of competition on the markets the firm operates. Thus the service product is what is supplied to or done on behalf of paying customers, reflecting the business of the product supplier. Process innovations are related to procedures and prescriptions of the process of generating the service product, the process of creating, assembling, composing or developing the service product which is being sold to customers or clients.

The processes or methods by which services are “put together” regards the tools, materials and other resources, and the procedures, skills and the knowledge that are used to transform resources into commercial services. This distinction is made with the expectation that for firms with client intensive servicing relations this distinction will prove difficult to draw.

Organisational innovations covers several forms of changes in the structure of firms, ranging from adaptive reorganisation to integrate process innovations into the organisation, to institutionalise new functional areas in the firm, as the establishment of an intra-firm marketing or IT department, and to changes in the make up of the firm through BPR processes, switching to team based or matrix based organisations etc. In the framework of table 1, this covers both the third and the fourth level, or fields of innovation. Market innovations correspond to entering new markets or niches or innovative changes in the way

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<sup>31</sup> See F. Gallouj 1998a, J. Hauknes 1996, J. Sundbo and F. Gallouj 1998, *op.cit.*

the firm organises its external relations, an example of the latter is implementing various forms of supply chain partnering.

### **The distinguishability of products and processes**

In the few tests of the indistinguishability of products and processes that have been performed, the indicated conclusion is negative; service firms are in general said to be able to distinguish products and processes<sup>32</sup>. Generally however, these tests have been small-scale interview-based tests or case studies. There are no systematic statistical investigations of this available. Analysis of a representative sample generated by the Norwegian 1995 R&D survey (Statistics Norway) covering more than 2 000 service firms allow us to draw some conclusions. This lead us to conclude that the problem related to product/process indistinguishability in services is a limited one.

Figure 4 shows the results of the 1995 survey on the inability to distribute revenues on new, improved or unchanged products for various service industries, and an aggregate comparison of service sectors to manufacturing industries.

What interests us here is not whether product or revenue concept of the relevant industry made it impossible to distribute revenues in an absolute sense, but rather whether there are significant differences between manufacturing industries, where the product/process distinction is treated as un-problematic, and service industries. Furthermore we would be interested in seeing whether there are differences between various service industries.

The leading service sectors, and thus potentially with the largest problem of distinguishing a product concept, are financial services (81%), transport services (27%) and the residual other services (26%), with a somewhat lower share in computer and business services and retail trade and HORECA. Hence apart from financial services the share in general roams about 20%. In manufacturing the top three sectors are pulp, paper and graphics (25%), transport equipment (21%) and food industries (17%). The significance testing leads to the conclusion that there is a significant (> 99%) difference between service and manufacturing industries, with a share in manufacturing of 14% and a share of 23% in service industries being unable to classify revenues accordingly. A comparison of the six category service classification indicates that the response of all service sectors except business and computer services are different from manufacturing at a 95% significance level.

There is one outstanding exception to the general picture of a share of ~ 20%; almost all firms in financial service industries states that it is impossible to do this distribution. The explanation of this is quite immediate. As is well known there is no sales concept in the financial industries comparable to revenues in non-financial enterprises<sup>33</sup>. Financial services explain almost all of the difference between services and manufacturing in this respect, the remaining variance between the two grand sectors is small.

This indicative analysis thus suggests that product-process indistinguishability is not an essential problem, neither in manufacturing and other non-service industries, nor in service industries at large<sup>34</sup>. However, the analysis also suggests that the product concept in itself

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<sup>32</sup> For a survey of some of these see G. Sirilli and R. Evangelista, **Science and Public Policy**, 1997

<sup>33</sup> For banks a 'revenue' concept includes net interest income, commissions and fees, while incomes for insurance companies are usually measured in through due (life) or gross (non-life) premiums.

<sup>34</sup> There is an important point to make here. It might still be that the 'representative' service firm distinguishes between products and processes differently than the 'representative' manufacturing firm. The argument above is not that this distinction is the same in some sense across the grand sectors, only that a distinction is made in both sectors.

may be more complex in service industries, in the sense that for a substantial share of firm units it does not allow an immediate and simple link between modifications in product characteristics and specification of revenue shares.

This point is interesting in itself, as to its consequences for interpretations of service products, but in addition it has a direct relevance for the issue at hand. The lesser distributional facility of service industries innovations along 'revenue dimensions' imply a locational difficulty of innovations in this revenue generating 'product space' (as f.i. in a Lancasterian analysis<sup>35</sup>).

There is thus a possibility that this affects the likelihood of respondents in these kinds of surveys to report innovations; to the extent that innovations as conceptualised by analysts lacks a locational support in this product space the likelihood is that incremental innovations-as-perceived-by-analysts will be reported with a lesser frequency than those with a stronger product space locational support. These 'immaterial' innovations are less likely to be considered innovations-as-perceived-by-respondents.

In a sense this implies a fairly simple-minded note of caution. We expect all firms and their representatives to use on a daily basis some product concepts, for the simple reason that what markets a specific firm operates in, what its business is, to a large extent is described in terms of what the firm supplies, in terms of the 'nature' of its products. Thus in general we expect no problems of using product and process concepts in a variety of industrial contexts. However, the product concepts used within any industry is flexible and nuanced, adapted to the circumstances in which they are used.

This may particularly be the case in industries where customisation and/or jobbing-like contexts dominate, where the 'information intensity' of products in some sense high<sup>36</sup>, but we argue the following assertion to be a general point. The product concept and the delimitation of a product-process distinction and the TPP innovation concept that is derived from this must in their essence be regarded as analytical concepts that bear no immediate relation to the industrial product concept. The implication of this is the need for considerable caution on the side of the analyst in how he conceptualises these concepts in various industries when he chooses to use them to structure not just information generated with other tools, but also the process of obtaining the information.

More specifically, there is need of substantial caution not to apply indiscriminately product concepts that are grounded in a framework of commodity-like production across industrial contexts. The possible problem with a product/process distinction does not lie in the terms and their applicability in themselves, but rather in how these are interpreted and used differently by analysts and respondents.

For our survey approach, we drew the conclusion that product/process indistinguishability should not be considered a general problem of service firms. We chose to include a specification of four categories of innovations to be covered by the respondents, distinguishing between product and process innovations, organisational changes, and changes in the firms' handling of its external relations. To aid respondents and ensuing analysis, we

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<sup>35</sup> K. J. Lancaster, *A new approach to consumer theory*, **Journal of Political Economy**, vol. 74, p. 132, 1966, K. J. Lancaster, **Consumer Demand: A New Approach**, Columbia University Press, New York 1971

<sup>36</sup> Customisation, here assumed to be a process of generating enhanced economic characteristics of the product, increases the specificity of the product. This implies that the bit length, or dimensionality, of information necessary to describe the product in economic and utility terms increases, and its relative information intensity is enhanced.

gave simple definitions of products, processes, changes in organisational structure and in the firms' external relations, cf. separate textbox.

Note should be made that these outlines were designed to be our definition of innovations. Innovations, in the analytical sense, are for us what improvements and changes individual firms state conforms with these outlines. Four features of this definition are noteworthy here.

**First** the concept of innovation is not used at all; rather than using 'innovation' we

#### **Attitudes of innovation in service firms in the STEP innovation survey**

- *Products* were defined as 'what services the company renders to its clients, defined as anything that is supplied to paying customers'. With the product concept including the way a product or service is *delivered* to customers, product innovation defined as significantly changed or new products explicitly includes the category of delivery innovations, a category of innovations that have been claimed to be a specific feature of service intensive firms<sup>1</sup>.
- *Production process* - or methods – was described as how 'the company 'puts together' (create, assemble, compose, produce or develop) the service or 'product'. Production processes, or methods, thus regards tools, materials and other resources, and procedures, skills and competencies used, with changes in these considered as process innovations.
- *Organisational changes* was suggested to concern changes in the overall structure of the business organisation, and in the principles under which an organisation can be said to be functioning. The replacement of personnel in existing positions was explicitly excluded from being considered as an organisational change.
- In describing changes in the firm's *external relations*, the focus was directed at significant (strategic) ties to other companies and organisations; to customers, suppliers, public agencies to avoid focus being drawn to 'ordinary' links to other clients and competitors, while at the same time avoiding unduly restrictions in possible functional forms of strategic ties.

On the basis of these definitions respondents were asked to consider changes that were

- the result of deliberate decisions and actions to improve performance, enhance product value and respond effectively to changes in the business environment,
- and which was expected to have significant impact on the company and its business.

consistently described what we interpreted as innovations by neutral terms like changes in product, process organisational or relational characteristics. We did this to make sure that we avoided any possibility of biases caused by common apprehensions of innovation as 'high tech' changes in manufactured products or organisations.

**Secondly**, this definition of innovation is intendedly wider than technology based interpretations of innovation, both in terms of scope by including organisational and relational innovations, and in terms of depth in opening for including 'softer' aspects of product and process innovations.

**Thirdly**, both in terms of a more apt definition of innovation and as necessary consequence of the wide scope and depth of the implied innovation concept, we focussed respondents' attention to two necessary aspects of the innovation process; the decision process of developing or implementing innovations is a deliberate and purposeful process. Innovations are thus interpreted as changes that are implemented by the organisation in a situation of choice between alternatives; innovations do not just happen.

**Lastly**, the intended purpose of innovations is to enhance firm performance, without specifying what the actual impact should be. These characteristics of innovation are general<sup>37</sup>, in the sense of not being specific to innovation in service firms. However, the character of some service industries and their products imply that the bias in measuring overall innovation performance caused by the traditional Oslo Manual style technological product and process (TPP) innovation concept is larger in service industries.<sup>38</sup>

## Conclusions

The Oslo Manual and the associated CIS surveys have provided a fertile ground for innovation research and policy analysis in the last decade. The revision process provides us with an important opportunity to take stock of this research and integrate it with other socio-economic research on innovation to improve the conceptual basis of the Manual, and enhance its relevance for the core objectives the Manual is designed to address.

Such a process, taking seriously the explorative intention behind the design of the Manual, requires a thorough process to establish a synthetic consensus of these researches. Furthermore, the experiences gained with the present manual and other insights acquired, allows us to be more specific in terms of what core questions the manual should address, how they may be addressed, as well as on the implications of addressing different needs with the same measuring instruments.

In the final end limitations have to be made on the scope and scale of the measuring exercise, where and how these are to be drawn require a consensus-building interaction between users and analysts, as well as with survey design expertise.

The momentum that has been built up in the performance and presentation of innovation data must, however, not be lost. It is important to continue the incremental performance and execution of innovation surveys as performed to date. But at the same time the intention of providing the Oslo Manual with a framework of systematic development and improvement demands a more systematic organisation than to date. Ensuring the short-term and long-term viability of the manual and (hopefully) bi-annual surveys, probably requires a two-pronged strategy and organisation.

While the short-term strategy basically will take the present objective structure as given, the longer-term one must definitely assess and reformulate these. What are the needs of innovation statistics from the policy side today? What are the research needs? Is international and inter-sectoral comparability an issue? What are the core questions today for exploration of innovation processes in our economies? What are the relevant areas of needs for permanent statistics for the various user groups of these statistics.

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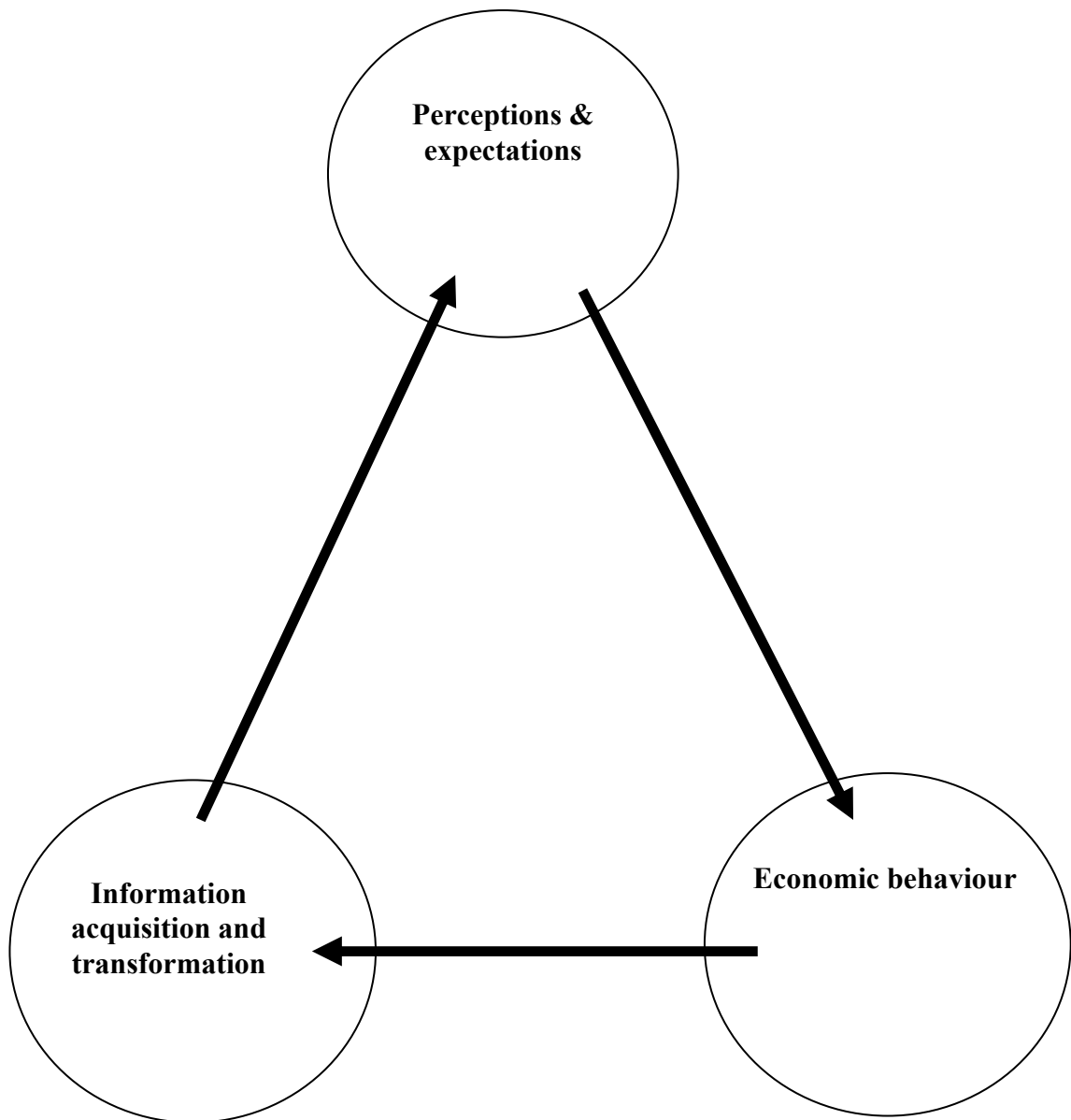
<sup>37</sup> A discussion of these aspects of the innovation concept is given in Hauknes 1997a.

<sup>38</sup> Note that the Norwegian data from the 1995 R&D survey on innovation performance referred to above does not refer to the Oslo Manual approach of TPP innovations. In principle this approach should therefore be comparable to our approach.

Only in addressing both sets of issues will we be able to ensure that the Oslo Manual and the innovation surveys it supports will continue to play an important and meaningful role for researchers, policy and industrial analysts, for policy makers and for other user groups.

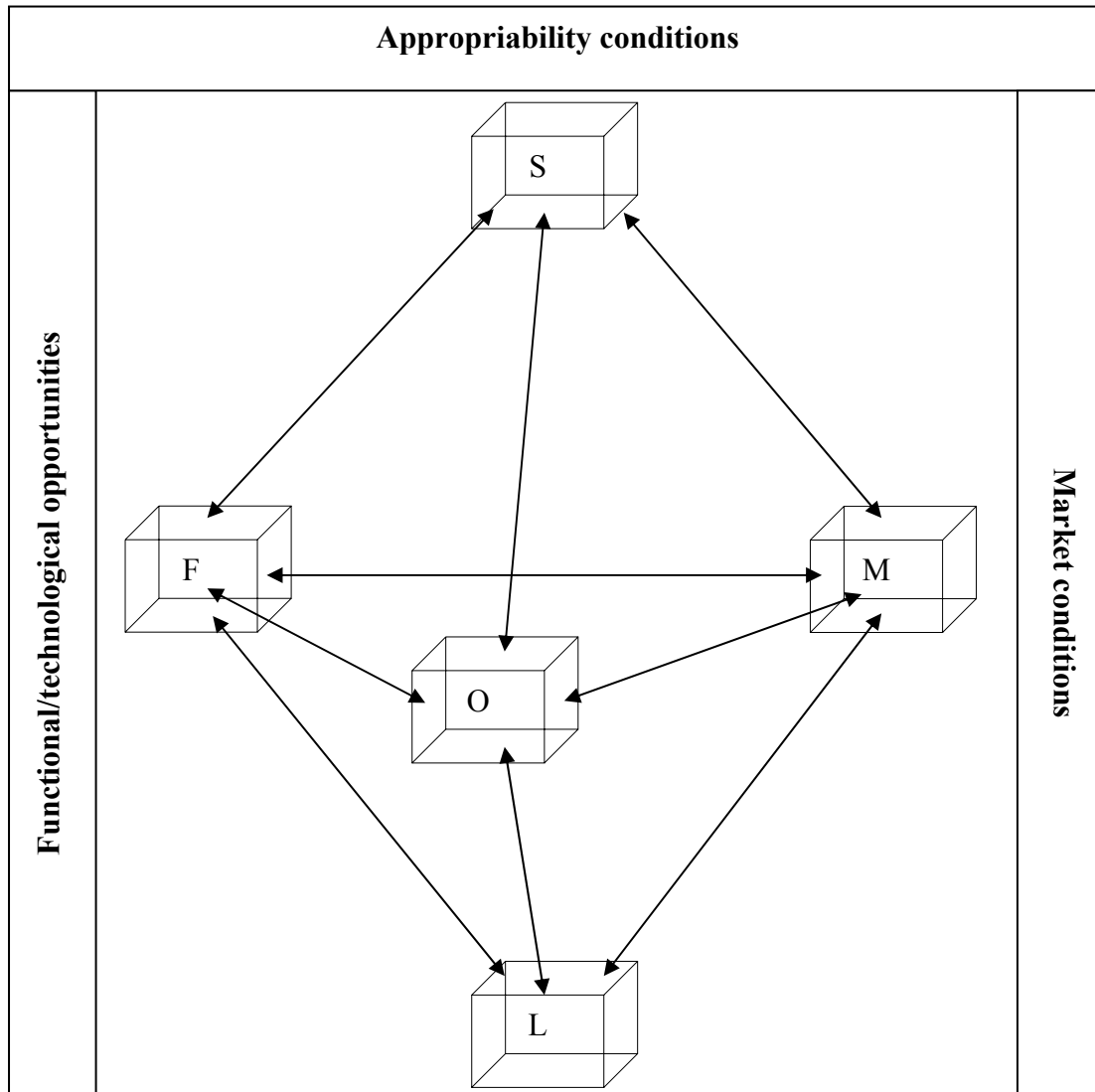






**Figure 1 The basic innovation feedback loop**



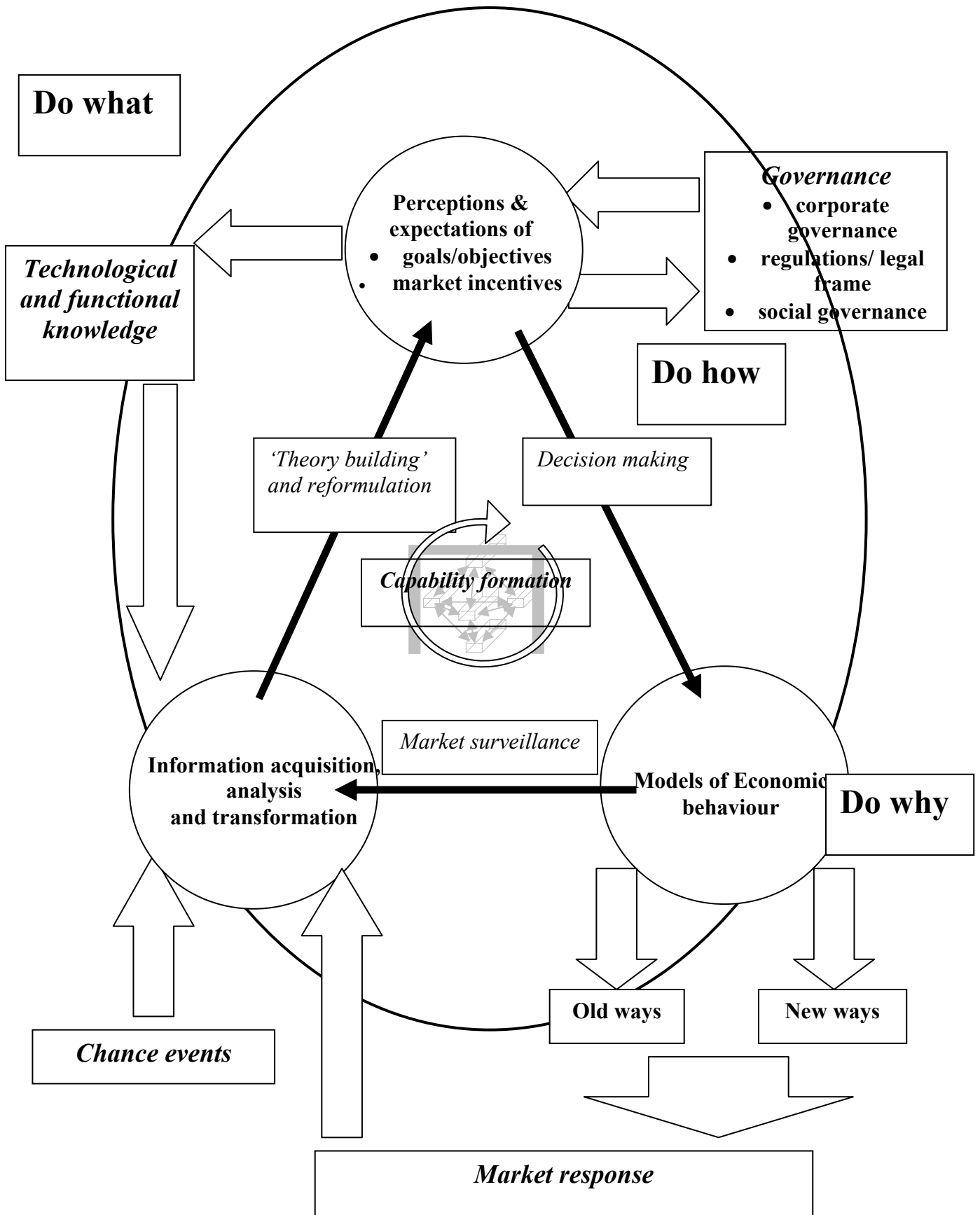


**Figure 2 Economic competences and the market environment**

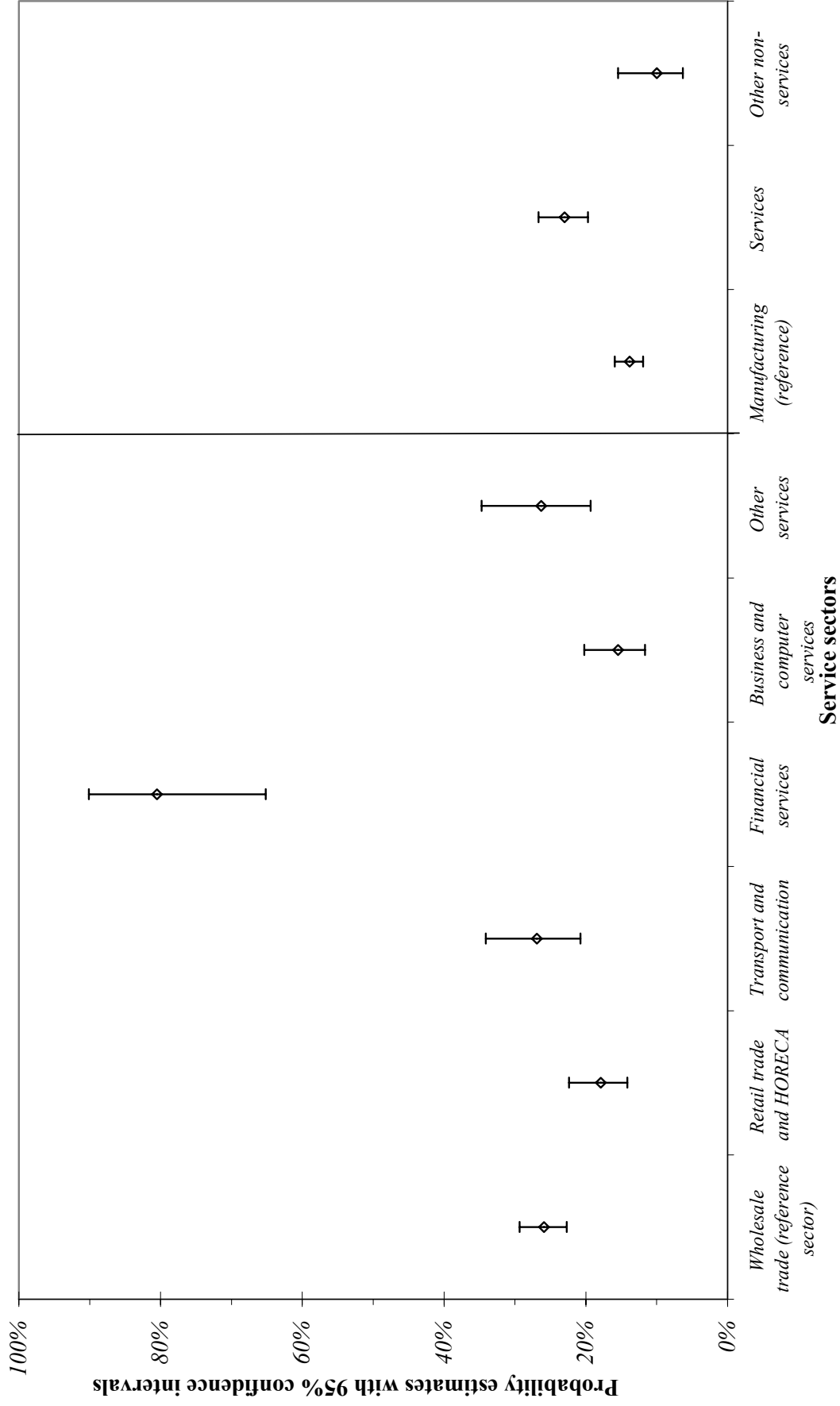
*S=selective or strategic capabilities,  
 O=organisational or integrative and co-ordinating capabilities,  
 F= technical or rather functional capabilities,  
 M= capabilities and understanding of market and demand characteristics,  
 L=the capability to learn, integrating and cutting through all of these.*



**Figure 3** Model of the innovating firm. Innovation is at the lower right. the vertical ellipse is the boundary between firm inside and outside.







**Figure 4** Probability estimates and confidence intervals of service industries of product innovators not being able to distribute sales on changed and unchanged products. Data: R&D survey 1995 Statistics Norway