Report prepared for DIME RAL.1 WP 1.2 Organisational Innovation: Concepts, definitions and measures

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Publication date:
2008

Document Version
Publisher's PDF, also known as Version of record

Report prepared for DIME RAL.1
WP 1.2 Organisational Innovation:
Concepts, definitions and measures

Deliverable D1.2.3
Organisational Innovation:
Survey of the literature and empirical evidence

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Introduction

This report consist of two basic sections. The first surveys the literature in order to show how the concept of organisational innovation is defined and measured. Preference has thus been given to empirical research while theoretical contributions have been considered where appropriate. The survey compares contributions from a range of studies of organisational innovation. As will be seen there is huge variety in these studies and the result is a richness that is more or less incompatible with the idea of a unique and unambiguous definition of organisational innovation.

The second section examines the possibility of developing harmonised measures of organisational innovation on the basis of the results of two EU-wide survey instruments. These are the third and fourth European Working Conditions Survey and the third and fourth waves of the Community Innovation Survey. The aggregate measures of organisational innovation derived from these surveys will be compared, and their relation to the European Innovation Scoreboard's summary innovation index will be examined.

1 Surveying the literature on organisational innovation

A recent survey of the literature on organisational innovation by Alice Lam (2005) divides the literature into three strands. The first of these strands is identified by a static focus on the relationship between the propensity of an organisation to perform an innovation and the characteristics of the organisation, its members and its context. This strand of literature has a long tradition of empirical research and is therefore a source of inspiration for measurement and definition of organisational innovation. It will be the topic of section 1.1. Section 1.2 is a special case of this literature, while the literature discussed in section 1.3 goes beyond what Lam defines as her first strand of literature and also includes studies of a more aggregate nature with an explicit policy focus.

The contributions within Lam's second strand of literature are concerned with characterising and analysing organisational learning or processes of knowledge creation rather than with organisational innovation in the sense of changes in organisational form and structure (Lam, 2005, pp. 124-126). Some of the issues addressed in this literature include the basis for shared identity or the way knowledge is embedded in social relations. While these issues are not completely unrelated to changes in organisational structure, they are nevertheless considered to be beyond the scope of this literature review and the associated literature is thus not included.

The final strand of literature identified by Lam has an explicit focus on long-term dynamics in the form of the creation of novel forms of organisation and how this novelty is diffused at the population level. The approach has led to reflections on the concepts of "organisational innovation" and "forms of organisation" but relatively limited empirical work. This strand of literature will be discussed in section 1.4.

Following the literature survey the results of the various strands of research will be summed up and generalisations regarding results and definitions will be attempted. Some generalisation will also be attempted with an eye to the balance between an unambiguous definition of organisational innovation versus a definition shaped by the methodology and data availability of any given study.

1.1 Organisational innovation as adoption

The following analyses all have in common that they are undertaken as studies of the diffusion of new practices[1] among a population of organisations. The general approach is to compile a list of new practices with the help of experts on the sector that is to be studied. A number of organisations are then interviewed to find out which of the practices on the list are adopted, when they were adopted and a handful of additional facts depending on the specific study.

Daft (1978) is a study of the relative propensity to initiate the adoption into the organisation of a new practice at different levels of the organisation's hierarchy. The adoptions of novelty are divided into technical and administrative innovations. Of interest for the purpose at hand are only the administrative innovations, which Daft (p. 198) defines as '*(...) pertain[ing] to the policies of recruitment, allocation of resources and the structuring of tasks, authority and reward.*' Whether a change to these aspects is considered an innovation is judged on a new-to-the-organisation basis (p. 197). A list of 68 innovations, 18 of which are administrative innovations, is compiled and 13 organisations, in this case school districts, are studied with respect to their adoption of the innovations on the list. The result is a population of 388 adoptions of a new practice or; 388 cases of organisational innovation (p. 200).

Daft's empirical analysis shows that what he defines as administrative innovations tend to be initiated at the management level. It also seems that the higher the level of education of the technical staff (here: teachers) the more prone they will be to initiate administrative innovations. And finally, the higher the number of practices that a given organisation has adopted, the clearer is the division of labour in initiating the innovation: management initiates administrative innovations while technical staff initiates technical innovations.

[1] Or, more generally: ideas. The implementation of these new ideas into the organisation is what constitutes organisational innovation.

The study by Kimberly and Evanisko (1981) is very similar to that of Daft (1978). The list of innovations used by Kimberly and Evanisko contain a total of 20 innovations, 8 of which are administrative innovations and these are all relatively similar in that they are defined as the adoption of electronic data processing in 8 different managerial functions (pp. 693-694). The units of the analysis are hospitals. The study by Kimberly and Evanisko compares the effects of individual, organisational and contextual variables upon the propensity of a hospital to adopt the practices on their list. With regards to administrative innovation Kimberly and Evanisko find that the idiosyncrasies of the hospital administrator, particularly her level of education and the extent to which she has contact with professional colleagues, positively affects the propensity of the hospital to perform administrative innovations. On the organisational level the only variable with significant effect upon the propensity to perform administrative innovations is the size of the hospital. The effect is positive.

The contextual level is defined in the analysis by Kimberly and Evanisko (1981) to be related to the market. They find that the potential demand, i.e. the size of the city in which the hospital is located, does not affect the propensity to perform administrative innovation. The intensity of competition, on the other hand, measured as the presence of other hospitals, has a positive effect upon the propensity to perform administrative innovation. To sum up the most relevant results of Kimberly and Evanisko (1981): organisational innovation is more common in organisations with highly educated management that is exposed to the influence of other managers and in organisations that are exposed to competition. Note that this supports the result of Daft (1978) that managers are the primary source of administrative innovation.

Han et al. (1998) is yet another analysis taking the approach of having experts construct a list of practices and studying the diffusion of these practices in a population of organisations. In this paper, however, the population being studied consists of banks and the explicit focus of the analysis is on the role of strategic choice and the interaction of strategy and context upon the propensity to adopt practices. Han et al. (1998) cite Damanpour (1991), which will be discussed below, as the source of inspiration to the distinction between administrative and technical innovation. Administrative innovation is defined as changes of organisational structure or administrative processes (p. 36).

Again, the researchers distinguish between technical and administrative innovation and the result of the analysis by Han et al. (1998) is that some strategies (what the researchers term "competitor orientation" and "interfunctional coordination" respectively) only affect the propensity to perform administrative innovation in conjunction with the contextual variables for market turbulence and technological turbulence. The contextual variables themselves also have direct effects. The strategy termed "customer orientation", on the other hand, has a direct and positive effect upon the propensity to perform administrative innovation. Finally, they find that performing either type innovation, technical or administrative, increases the propensity to perform the other.

All of the effects found to be significant are also positive. What this means is that a volatile context seems to push for administrative innovation and that the effect of the strategy followed by the organisation upon the propensity to innovate is also affected by the context.

The final analysis that is to be described in this section is that of Damanpour (1991). This is a meta-analysis: Damanpour's data is based on a large number

of analyses from which the correlations between various explanatory variables and the propensity of an organisation to perform innovations are extracted. Damanpour uses the distinction between administrative innovation (which he defines as changes in organisational structure or administrative processes, p. 560) and technical innovation as a moderator variable, i.e. as an interaction term that may explain the differences in the correlations discovered by other researchers.

The only consistent difference between the two types of innovation is that specialisation positively affects the propensity to perform administrative innovation. "Specialisation" is defined as a large variety of highly educated specialists among the members of an organisation. Other results that are observed repeatedly but not consistently are that flat, flexible organisations with highly educated members and strong external communication links perform more administrative innovations.

The four analyses presented above: Daft (1978); Kimberly and Evanisko (1981); Han et al. (1998) and Damanpour (1991), all include different aspects and have different emphases: context, strategy, management and what not. As will be seen in later sections their results are quite compatible with research undertaken from very different starting points.

1.2 Organisational innovation as pervasive change

The research that will be presented in this section takes a more holistic approach to organisational innovation than the research presented in section 1.1. Rather than using the term "organisational innovation" to describe the process of adopting new ideas the term is used to denote a type of innovation. This means that the use of "organisational innovation" in the following section is to some degree synonymous with "administrative innovation" in the previous section. However, similarly to the previous section, it is diffusion of an organisational innovation that is studied.

The approach of the analyses presented below is holistic in the sense that organisational innovation is seen more or less as the restructuring of the organisation; not just as the adoption of a particular practice. This means that there is more focus on the discontinuity of innovation.

Teece (1980) is a relatively short paper that demonstrates how the diffusion of an organisational innovation may follow the logistic curve often used to depict diffusion of technical innovations. Teece studies two populations of firms: one is the petroleum industry while the other is a population of early adopters of the M-form organisation across industries. The innovation that Teece studies is the M-form organisation and he shows that the probability of any given organisation to be transformed into an M-form organisation is positively related to the expected profitability of the transformation as well as the prior penetration of the M-form organisation.

The explicit aim is to show that the logistic diffusion model is not only applicable to technical innovations and thus argue that it should be investigated whether there are other of the well established results of studying technical innovation that can be generalised to also apply to organisational innovation (p. 470).

The study by Bolton (1993) has a very different aim. Based on whether or not organisations have chosen to join an R&D consortium Bolton studies

the role of sub-standard performance as an incentive for organisational innovation. Bolton's data comes from a survey of high-tech firms. He finds that low performance is indeed a catalyst for organisational change. He also finds, in accordance with the results of Teece (1980), that higher levels of penetration of an innovation increases the likelihood of adoption for a given organisation. In other words: organisations struggling with performance problems are more willing than others to act as early adopters of an innovation but when the innovation has become relatively common among the organisations of a population the perceived risk is lower and above average performing organisations will adopt it as well.

The final analysis to be discussed in this section is that of Boer and During (2001). It must be noted that the paper is not a presentation of their study itself; it is a comparison of the authors' experience in studying product, process and organisational innovation.

The organisational innovation in question is the adoption of what is called 'total quality management', or simply TQM, and their data is from a survey on Dutch manufacturing. When comparing their earlier analyses Boer and During note that organisational innovation has a tendency to be driven by the requests of collaborators. It also seems that organisational innovation is more complex than other types of innovation and thus requires a lot more attention from management if it is to be adopted successfully; often it will even be beneficial for the organisation to undergo a change of management in conjunction with the organisational innovation (pp. 100-102). All in all, though, they conclude the same as Teece (1980): there are surprisingly many similarities between the different types of innovation and the factors that are important for one type of innovation will also often be important for other types of innovation.

It is interesting to note that this similarity between different types of innovation was not found in the analyses discussed in section 1.1. These papers all dealt with the ability of organisations to perform innovations in the sense of adopting new practices, and the distinction between technical and administrative innovations was an important explanatory variable.

The focus of section 1.1 was on discussing the results that the various authors had obtained with regards to administrative innovation. The following paragraphs sum up the most important differences between technical and administrative innovation found by these studies as a contrast to the above evidence that the difference between them is limited: Daft (1978) finds that management is the primary source of administrative innovation while technical innovation is initiated by technical staff; Kimberly and Evanisko (1981) find several differences in the effects of individual, organisational and contextual variables upon the two types of innovation. In particular, it is shown that centralisation negatively affects technical innovation but does not affect administrative innovation, that the size of the city positively affects technical innovation but does not affect administrative innovation and that the hospital administrator's contact with professional colleagues positively affects administrative innovation but does not affect technical innovation. Han et al. (1998) find that most interactions between contextual turbulence and the strategy of the bank varies with the choice of dependent variable, i.e. with type of innovation. And finally, Damanpour (1991) find several differences between type of innovation and effect of explanatory variables, most notably the much stronger effect of specialisation upon administrative innovation as compared to technical innovation.

An interesting note is that Damanpour (1991), p. 562, discusses the merits of studying the diffusion of a list of practices compared to a single practice. As organisations commonly will perform more than just a single innovation over a given timespan the results of studying just one will vary with which innovation is chosen. By studying a larger number of innovations the effect of innovation specific factors are mitigated.

In the following section a group of studies, all having an approach to the term "organisational innovation" that is equally holistic to those of section 1.2, will be discussed. The major difference is the way in which organisational innovation is measured. In section 1.3 organisational innovation is studied at a relatively abstract level in the sense that organisations are deemed to have undergone innovation when the members of the organisation themselves indicate that the organisation has undergone non-trivial change.

1.3 Abstract organisational innovation

As already mentioned, the papers presented in this section have in common that organisational innovation is measured somewhat more abstract compared to the studies of the previous two sections.[2] A second common feature of the papers is their explicit policy level focus; the studies pay particular attention to the context of the organisations and how organisational innovation affects this context.

Machin and Wadhwani (1991) is a study of the relationship between the influence of unions and organisational change. Organisational innovation is judged to have taken place at organisations that indicate in a survey[3] to have undergone 'substantial change in work organisation or work practices not involving new plant, machinery or equipment'. The survey is undertaken in Great Britain in the early 1980s; a moment where anti-union legislation was being introduced and unemployment was relatively high (pp. 841-842). Based on this development Machin and Wadhwani argue that it was a period in which union power subsided and results should be interpreted with this development in mind.

The results reported in Machin and Wadhwani (1991) are that unionised organisations were more likely to undertake organisational innovation in the early 1980s than were other organisations. It is hypothesised that this relationship is caused by unionised organisations being more rigid and thus, as union power subsided, these organisations would undertake the change that the unions previously kept them from undertaking. The hypothesis is substantiated by flexibility being cited as the objective of the organisational innovation by a relatively high proportion of the unionised organisations and by organisational innovation at unionised organisation generally costing more jobs than organisational innovations elsewhere (p. 847).

The results of Machin and Wadhwani (1991) are quite interesting but it should be noted that their results are not overtly robust (pp. 848-850).

Gjerding (1996) describes the data from the Danish DISKO survey pertaining to the years 1993-1995. He does so with a consistent division of the

[2] 'Abstract' in the sense that no concrete definition of organisational innovation is employed, representatives of the organisations are simply asked whether or not the organisation has undergone non-trivial change.

[3] The Second Workplace Industrial Relations Survey pertaining to the years 1981-1984.

population into two groups: one of organisations that have undertaken organisational innovation and one of organisations that have not.[4] However the data is analysed in much more detail in Lundvall and Kristensen (1997).

Lundvall and Kristensen (1997) find that organisations that have been subject to increased competitive pressure are more likely than others to have undertaken organisational innovation as well as technical innovation (pp. 12-13). It is argued that the causality runs from competition to innovation: the fact that organisations reporting to have undertaken technical and/or organisational innovation to a large degree coincide with the organisations reporting to have experienced an increase in competitive pressure is interpreted as showing innovation to be responsive (p. 10).

Lundvall and Kristensen note that organisations which experience organisational innovation tend to change towards structures that are more functionally flexible, to increase the extent to which they collaborate with suppliers and customers, to increase the attention given to the continuous development of the skills of their members and to increase their demand for highly educated labour. The authors focus on the policy relevance of these results (p. 25). It is argued that the development of competitive organisational forms requires a workforce that is not only highly educated but which is continuously learning new skills and adapting their old skills. The problem for policy makers is to ensure that the entire workforce is subject to continuous learning; the alternative is social polarisation between the skilled and the less skilled people.

The study by Piva et al. (2005) is similar in approach as well as conclusion to that of Lundvall and Kristensen (1997). Piva and colleagues compare Italian survey data collected by an investment bank in 1991 and 1997 with questions pertaining to 1989-1991 and 1995-1997 respectively.[5] The explicit aim of the study is to determine whether organisational change brings about skill bias in labour demand in a similar manner to that of technical innovation. Their results are that organisational innovation on its own decreases the organisation's demand for less educated workers and that technical innovation does not significantly affect labour demand. But they also find a synergy effect of the two types of innovation: organisational innovation complemented by technical innovation decreases the demand for less skilled labour even more than organisational innovation on its own while simultaneously increasing the demand for skilled labour.[6]

The conclusions of Piva et al. (2005) share the policy perspective of Lundvall and Kristensen (1997) as well as the policy implications. It is argued (pp. 153-154) that policy makers must focus on educating the entire workforce and that it is necessary for workers to learn continuously throughout their professional lives. Furthermore it is argued that education systems must supply students with general skills and with the ability to learn continuously so that special and vocational skills may be acquired at the workplace as need be.

The final study that will be presented in this section is the work reported in

[4]The wording of the demarcating question is: '(has your organisation) undertaken important organisational change during 1993-1995?'

[5]Whether or not an organisation has performed an organisational innovation is determined by its response to a question asking 'whether the firm has carried out significant organisational change to its structure'.

[6]However, their measure of technical innovation is a bit atypical: firms that have invested in R&D are judged to have performed technical innovation.

Greenan (2003). This study is different from those above in that it does not rely on an abstract survey question for identification of organisational innovation. In fact, Greenan does not distinguish between innovation and change; instead she uses statistical data reduction techniques to identify patterns of change by joining the data from two surveys and registry data[7] for French manufacturing firms.

Greenan identifies three patterns of change along with a group of firms that change only very little or not at all. Her categories are: those that change towards a functionally flexible structure, those that change towards increased specialisation and those that change towards stricter hierarchical organisations. Greenan studies the performance characteristics as well as the occupational composition of all four types of firms.

With regards to performance, it is shown that the group of firms moving towards increased specialisation creates the most jobs but also has the lowest productivity growth while technical innovation happens more often at the increasingly flexible firms. The firms that are changing towards increased flexibility have significantly fewer managers as a percentage of total members of the organisation than the rest of the population but the share of managers seems to be rising. Greenan is not able to explain this development as it should be expected that flexible organisations were flatter than others (p. 308). These increasingly flexible organisations also have a particularly high labour turnover rate. As could be expected the organisations moving towards stricter hierarchies have relatively few skilled blue-collar workers and relatively many unskilled blue-collar workers. Expectedly the number of managers at the increasingly hierarchical organisations is growing, while the numbers of skilled blue-collar workers and clerks are falling.[8]

In her paper Greenan also analyses the effects of technical innovation and the result is that technical innovation seems to affect the quantitative demand for labour while organisational change affects the occupational composition of labour demand in the pattern described above. Dynamic effects such as the increased propensity to undertake technical innovation for the increasingly flexible firms thus also have to be taken into account when interpreting the results in a policy perspective. The resulting policy advice is much the same as that given by Lundvall and Kristensen (1997) and Piva et al. (2005): national systems of education need to be designed not only to create a highly educated workforce, but to be part of an institutional set up that allows workers to learn continuously and which supplies the organisations of the economy with a qualitatively adaptable supply of labour.

The papers presented in section 1.3 are different from those of sections 1.1 and 1.2 in that not much attention is paid to the distinction between change and innovation. What is considered innovation is left to the cognitive skills of the survey's respondents. They are asked to consider subjectively whether their organisations have undergone substantial (Machin and Wadhwani, 1991), important (Lundvall and Kristensen, 1997) or significant (Piva et al., 2005) change. In this sense the studies are susceptible to the critique of Damanpour (1991) there is no guarantee that any of the organisations in the survey have un-

[7] A survey on organisational change conducted in 1993 by SESSI and INSEE, the ESE survey on employment structure and BIC financial data.

[8] Only the statistically significant effects are reported here. I.e. those relationships that are significantly different from the rest of the population.

dergone comparable change. The approach of Greenan (2003) does not actually deal with organisational innovation at all (and, indeed, neither does she claim to do so). Her approach is to define a taxonomy of patterns of change; that is, to group firms that have undergone similar types of change and analyse them separately. Had she simply grouped the firms by those that had changed and those that had not, her result may very well have been similar to that of Lundvall and Kristensen (1997): the firms that have changed tend to have become more flexible.

An approach similar to that of Greenan (2003) is to define categories of organisations and study how these categories (or species) come into existence, how they are diffused (or reproduce) and how the market forces select which will proliferate and which will die out. As will be seen in section 1.4 such studies tend to be theoretical rather than empirical and Greenan's contribution definitely must be seen as a breath of fresh inspiration to the empirical side of evolutionary studies. The evolutionarily inspired approach to organisational innovation is discussed in the following section.

1.4 Evolutionary organisational innovation

In the evolutionary literature a number of biological analogies are (sometimes implicitly) employed, such as the idea of species. When conducting empirical research on organisational innovation the corollary becomes to define types of organisations, to discuss the relative abundance of different types at different times and to discuss the process in which new types emerge and old types disappear (Lewin and Volberda, 1999, p. 529). This leads to a strong focus upon the relationship between evolution and context and thus to discussion of dual causalities and of co-evolution. For the purpose at hand, this means that the development of organisational forms should be seen as affected by the development of technology and of society as a whole. As discussed by Tushman and Nelson (1990) this discussion goes back a long way in economic theory, not least to Schumpeter and Marx. It is based on the tendency for technological advance to make work routines redundant while at the same time the structure of work routines affects the direction of technological advance; and while work organisation affects the structure of e.g. education systems so does the education of the work force affects the way in which work is organised.

At the end of section 1.3 the similarity of the approach by Greenan (2003) and the evolutionary approach was highlighted. Greenan's main relation to the evolutionary literature lies in her construction of species, though she does not analyse them in a particularly evolutionary framework. This section on evolutionary theories of organisational change will start by referring to the results of a study that is in fact not evolutionary at all. This is the study by Armenakis and Bedeian (1999). Armenakis and Bedeian conduct a literature survey of the strand of literature that has here been discussed in section 1.1 and contains as such not much that is new to the present discussion; but their interpretation of the studies can be seen as a link to the more evolutionary studies. Armenakis and Bedeian refer to a number of studies in the health, aviation and banking industries and discuss them from the viewpoint of four different research themes. One of these viewpoints, that which Armenakis and Bedeian label "context issues", comes quite close to the viewpoint of this report in that it focusses on

forces and conditions in the organisations' internal and external environment.[9] They find that the more turbulent the environment of an organisation, the more likely it is to adopt an organisational innovation: discontinuous change in external environment prompts organisations to change as well. The link to the evolutionary studies is in this interpretation of the relationship between context and the adoption of new ideas/organisational innovation.

As indicated by the use of the term "evolution" the contributions that are to be discussed in this section are on continuous change not discontinuous innovation activity. It is the speed of change that is seen to vary. Studying short periods of rapid change and studying innovation, though, are mostly indistinguishable disciplines.

Armenakis and Bedeian (1999) see organisational innovation to be responsive (p. 300); they argue it to be a course of action that is forced upon organisations because of change in their external environment. This is very similar to the arguments of more evolutionary oriented research such as Anderson and Tushman (1990) and Gersick (1991).

The arguments of the contributions of Anderson and Tushman (1990) and Gersick (1991) are very Schumpeterian in that they argue for wave-form evolution: a cyclical development in which short periods (bursts) of novelty are succeeded by long period of low change where the novelty is diffused and incrementally modified (equilibrium periods). This approach is also called "punctuated equilibrium".

Anderson and Tushman (1990) Discuss the evolution of technology from one dominant design to the next and organisational forms to be trailing this technological cycle. At different parts of the cycle different organisational traits will be beneficial (p. 629). At some times organisations must engage in the incremental technological development of dominant designs, while at other periods of time organisations need to take part in (or at least follow closely) the revolutionary development of new areas of technology.

Gersick (1991) also discusses these wave-form or punctuated equilibrium models. But she focusses on what it is that breaks the equilibrium; on what it is that initiates the periods of revolutionary change. Her answer is that discontinuities in context push for change (cf. the above discussion of Armenakis and Bedeian (1999)). This means that organisations need to be flexible. For organisations to be flexible they need resources and they need updated information on their context. Gersick focusses on the labour market and argues (pp. 23-24) that flexible labour markets that allow firms to hire the amount and category of labour that they need are thus important for successful organisations. Furthermore for relevant new ideas and knowledge to enter the organisations they need to be able to shed their management and incentives systems thus need to be designed with this in mind.

Romanelli and Tushman (1994) conduct an empirical study of such punctuated equilibrium models of evolution. They define three dimensions along which organisations change. If evolution does indeed follow the punctuated equilibrium model it should be expected that change happens along all dimensions at once; and so it is found to do. What is more, it also seems that these bursts of organisational change are accompanied by change of management and shocks

[9]The other three viewpoints are: Content issues: the substances of change, process issues: enactment of intended change and criterion issues: outcomes of change efforts

to supply or demand, i.e. contextual shocks, just as was theorised by Gersick (1991).

Punctuated equilibrium models do not say much of organisational innovation: they do not study how new forms of organisation arise nor do they study by which process they are sorted for selection. Organisational change is studied as passive and responsive and the models are largely descriptive, as also noted by Lam (2005) p. 136.

There are other evolutionarily minded researchers that do in fact discuss innovation and selection and these may be divided into two classes: those that see incumbents as inert and entrants as the primary source of novelty and those that see incumbents as capable of innovating as well. Hanna and Freeman (1984) is an example of a theoretical contribution of the prior class. They argue that accountability and consistency in performance are the traits favoured by capitalist society and that selection therefore favours organisations that are good at reproducing themselves, i.e. good at performing the same routines over and over again (pp. 154-155). Successful organisations are thus also very inert and new forms of organisation must come through entry of new organisations into the population.

That is not to say that entrepreneurship is the sole source of novel organisation of work. Hannan and Freeman concede that incumbents may attempt to re-invent themselves and even be successful in some occasions (p. 161). But it is in the new organisations, where new routines are being laid out and carried through for the first time, which are the primary source of new species in any population of organisations.

When, on the other hand, new organisational forms are argued to originate at incumbent organisations a focus on concious managerial choice[10] is introduced. Examples of such are Child (1972) and Lewin and Volberda (1999).

This focus puts emphasis on the co-evolution of organisations and their context, for it raises the questions of where to define the boundaries of the organisation. As managerial influence often stretches beyond the borders of the legal unit that is the organisation the concept of organisational innovation will also have to be widened. There is little doubt that the there are many cases in which the reach of strategic decisions at a given organisation will affect the collaborators of the organisation directly as well.

The focus on organisational innovation as strategic choice is not at odds with viewing organisational innovation as a responsive process prompted by changes in the environment of the firm; the strategic decisions taken by management is definitely affected by environmental change. But a link may also be seen going in the other direction: managers know that organisations and their context co-evolve, and therefore they will seek to affect the evolution of the context (Child, 1972, p. 9).

The evolutionary theories of organisational change discussed in this section can generally be seen as three different strands of literature (an approach also taken by Lam (2005) in her survey of the literature). Some analyse cyclical development, some analyse innovation created by entry and the selection among this novelty while still others analyse innovation created by incumbents and the selection among this novelty. There are however a number of similarities.

[10]Concious choice must not be confused with the traditional idea of rational choice. None of the authors referenced in this section claim that managers make decisions that are rational in the neo-classical sense.

All strands stress the importance of the development of context; just as biological evolution of species is heavily dependent upon the evolution of their environment. The various studies also seem to agree upon management playing a pivotal role in organisational innovation; either as instigators of change or as an inert centre of the organisation that needs to be replaced for innovation to take place.

To some degree they also all share a focus on the continuous change within organisations, in the sense that the pace of change is the focus of the punctuated equilibrium models while the question of what degree of internal change is necessary for a new form of organisation to emerge is central for the population oriented studies. These latter studies may also be said to focus on continuous change in the sense of changing population-level characteristics.

In the following section the various strands of literature discussed throughout the subsections of section 1 will be compared to identify common ground in the study of organisational innovation as well as points that are still contested.

1.5 Conclusions

This survey took the partitioning of Lam (2005) of the literature into three strands as a point of departure. It was chosen only to pursue two of Lam's strands but two additional strands were added to make a total of four distinct categories within the literature on organisational innovation. The contributions of each strand will be summed up in section 1.5.1 while the term "organisational innovation" across the variety of literature will be discussed in section 1.5.2. Section 1.5.3 will conclude the report with a comparison of the different strands.

1.5.1 Results

In section 1.1 a number of studies all defining organisational innovation as the adoption of new practices into the organisation where discussed. Common to all of these studies is the identification of innovation on a new-to-the-firm basis, but there is some difference in the range of practices that are categorised as organisational innovation.

Two of the studies, Daft (1978) and Kimberly and Evanisko (1981), have a heavy focus upon managerial processes in their definition of organisational innovation[11] while the remaining two, Han et al. (1998) and Damanpour (1991), both broaden the definition to also include organisational structure. Regardless of the definition, however, some results emerge consistently.

Firstly, management is consistently identified as being important for organisational innovation; it is management that identifies the need for and is responsible for the implementation of organisational innovation and therefore the willingness of management to experiment with novelty is imperative to organisational innovation. Secondly, there is some evidence suggesting that the volatility of the environment affects the propensity of an organisation to undergo organisational innovation, such as stronger competition leading to more adaptation in organisational structures.

The results of the meta-analysis by Damanpour (1991) do not conform to this generalisation, but neither do they contradict it. Damanpour concludes that

[11] Note that the studies referenced in section 1.1 all use the term administrative innovation for the type of innovation that is here called organisational innovation.

flat, functionally flexible organisations undergo more organisational innovation than other organisations and, as shall be seen in the following, this result is very much in line with the results of others strands of analysis.

A word of caution for the analyses of section 1.1 relates to the generalisability of the results. Constructing a list of novelties that have been introduced into a given population (e.g. NACE grouping) of firms and mapping their diffusion through surveys and follow up interviews is very time-consuming and the studies referenced above tend to focus on relatively narrow sectors.

The generalisations compiled from section 1.1 are also shown in table 1 on page 17 along with the corresponding generalisation of sections 1.2, 1.3 and 1.4.

The papers discussed in section 1.2 are strictly speaking not all on pervasive organisational change. The paper by Bolton (1993) should rather be seen as a study of the diffusion of a single organisational trait: R&D collaboration. The paper has nevertheless been included in section 1.2. It is quite different from the other papers discussed in section 1.1 in its focus on just one trait; and even a trait that does not conform to the definition of an organisational innovation of section 1.1.

The studies reported by Teece (1980) and Boer and During (2001) do not focus on the same aspects of organisational innovation, though their approaches are very similar: the transmission from one archetype of organisation to another. But note that the study of the diffusion of archetypes comes close to studying the diffusion of a single organisational trait; in as far as belonging to an archetype is a binary indicator of organisational structure. The results of Teece (1980) are very similar to those of Bolton (1993): As an organisational type becomes diffused the uncertainty associated with adoption decreases, while at the earliest stage of diffusion it takes convincing financial incentives to persuade the management of an organisation to initiate an organisational innovation.

The study by Boer and During (2001), on the other hand, find results that are very much in line with those of section 1.1: The involvement of management is very important to the efforts for organisational innovation and market context is an important source of incentives for organisational innovation.

The sources of data varies between Teece (1980), Bolton (1993) and Boer and During (2001); but in general, identifying whether an organisation has undergone transformation can be measured with a survey and it will thus typically be simpler than studying the diffusion of a list of practices. However, there are some caveats to this approach. First of all the definition of archetypes is inherently subjective. Secondly in as far as the studies are focussed around a single trait of the organisation, they are susceptible to the criticism of Damanpour (1991), as also discussed in 1.2: organisations continuously adopt a multitude of traits. By singling out a specific trait the effect of the remaining traits will cause bias in the study.

In section 1.3 a third strand of literature was discussed. This strand takes a view on organisational innovation that is as holistic as the strand discussed in section 1.2, but more abstract in the sense that organisational innovation is defined as any non-trivial[12] change. This approach is subjective but not in the same sense at the above approach: here, it is the subjective perception of the survey respondent that evaluates whether an organisational innovation has

[12] "Non-trivial" is a term used here to cover all of the terms used in various surveys; e.g. significant, important or substantial change.

taken place or not. The abstract approach to organisational innovation is also more generalisable in that any organisation may undergo non-trivial change and the inclusion of e.g. manufacturing and service firms alongside each other is thus feasible.

A reoccurring result of the studies presented in section 1.3 is that change is towards functionally flexible forms of organisation, that these organisations are the prime sources of technological novelty and that they require labour that is both highly educated and capable, as well as willing, to learn continuously.

The final strand of literature that has been discussed in this survey is the evolutionary studies of section 1.4. These contributions do not study innovation as a discrete phenomenon; they study the continuous change of organisations. This approach is in certain aspects similar to that taken by the authors studying organisational innovation as an abstract phenomenon: asking a respondent whether her organisation has undergone non-trivial change is basically the same as asking whether the pace of change has been higher than usual.

Though there is some variation among the evolutionary studies they tend to conclude that management is highly important to organisational innovation, even to the degree that a change of management is seen as a precondition for successful organisational innovation. In varying degree the studies also emphasis the co-evolution of the organisational forms in a population and the context of the population. As highlighted by Child (1972) and Lewin and Volberda (1999) this co-evolution means that the boundaries of organisations are not discrete; they are determined by the reach of the organisation's authority. This indicates that also changes in relationship to collaborators should be considered an organisational innovation. Bolton (1993), on the decision to join an R&D consortium, is the only empirical work referenced in this survey to do so.

As already mentioned, the evolutionary interpretation of organisational innovation has a focus on change rather than innovations. However, there may also be a grouping of organisations into types or species, i.e. groups of firms that are alike, as a heuristic tool for studying an evolving population. To some degree this is similar to defining archetypes as discussed above; but species need not adhere to some predefined typology of organisational forms, they may as well be products of statistical data reduction techniques. This is not an easy approach to empirical studies, as the scarcity of evolutionary empirical studies suggests. When defining species by statistical techniques one must be aware that no to samples will produce the same species, and thus the study of the evolution of the various species becomes difficult and more subjective than at first sight.

1.5.2 "Organisational innovation"

Much of the literature of Lam's first strand, what is here discussed as two different strands in sections 1.1 and 1.2 respectively, base the definition of organisational innovation on theoretical contributions from the late 1960s. One of these contributions, one that is cited several times, is Knight (1967). Knight discusses organisational innovation as the process in which an abstract idea is implemented into an organisation (pp. 478-479). That is, organisational innovation is not a type of innovation, it is the process of incorporating new knowledge, be it technical, administrative or what not, into the organisation. In this connection innovation is defined as change that is new to the firm; im-

plicetly indicating that each organisation is seen as qualitatively unique so that the application of a given idea to an organisation constitutes a new combination of existing knowledge as long as the idea has not previously been applied in the organisation.

As has been seen from the discussion of the literature in sections 1.1 and 1.2 this definition lead empirical studies to focus on the diffusion of these new ideas rather than their creation. This is contrasted by the more abstract studies of section 1.3 that simply focus on non-trivial organisational change; i.e. it does not constrain organisational innovation to a list of generally agreed upon possible ideas that may be implemented.

The definition of innovation as the introduction of a new idea into an organisation is quite Schumpeterian. Schumpeter's influence on the concept of innovation is noted shortly by Knight (1967) but discussed to some length by Lam (2005) and Drejer (2004). Schumpeter defined five types of innovation: New goods, new methods of production, new markets, new sources of production or half-manufactured goods and new organisations of industry. Whether changes to the organisation of firms constitute new methods of production or new organisations of industry is not commonly agreed upon. Lam and Drejer both seem to include it in Schumpeter's category of new organisation of industry, but Schumpeter himself used the establishment of a monopoly as an example of a new organisation of industry and Edquist et al. (2001) includes organisational innovation as a sub-type of process innovation alongside technological process innovations.

The definition of organisational process innovation by Edquist and colleagues differs somewhat from the definition of Knight; it is in a sense more holistic. Edquist et al. (2001) pp. 15-16 defines organisational process innovation as changes to business practices / to the way human resources are coordinated. As examples he lists just-in-time production, lean production and total quality management, i.e changes of archetype as in section 1.2. In this view organisational innovation is not the modification of routines or the adoption of single practices; it is the fundamental alteration of the method of production.

In the Oslo Manual[13], on the other hand, organisational innovation is defined as a type of innovation alongside product, process and marketing innovation. According to §177 of OECD/Eurostat (2005) an organisational innovation is '*(...) the implementation of a new organisational method in the firm's business practices, workplace organisation or external relations.*' And, according to §179, what distinguishes change from innovation is that '*(...) [the method] has not been used before in the firm and is the result of strategic decisions taken by management.*'. This definition indicates that research on organisational innovation should be undertaken along the lines discussed in section 1.1, but there are a couple of interesting differences. The definition by the OECD and Eurostat is clearly wider than that employed by any researchers referenced in section 1.1. None of them include changes in external relationships and some only study changes in management processes. Furthermore, none of them have an explicit focus on managerial choice. If anything it seems that the OECD and Eurostat have been influenced by some of the evolutionary literature in their definition of organisational innovation, most notable Child (1972) and Lewin and Volberda

[13] A publication by the OECD and Eurostat with the subtitle: Guidelines for collecting and interpreting innovation data.

(1999) with their focus on the importance of managerial choice and the relevance of context.

The definition of organisational innovation in the Oslo Manual raises an epistemological problem: can there not be new-to-the-firm organisational change that has not been initiated consciously by management? Should such 'spontaneous mutation' not be included in a definition of organisational innovation? And, equally important, can we ever be sure that innovations initiated by management are not rejected at the shop floor where nothing thus changes?

The latter of these questions is also raised by Scheinstock (2004), p. 159 and he suggests that studies of organisational innovation should therefore be undertaken at the level of the worker. As also pointed out by Scheinstock the differences in frames of reference and criteria for evaluation among workers and management will mean that even innovations that are seen by management to have a sweeping effect may actually have very little effect. This will only be uncovered by interviewing the workers.

By stressing the conscious choice of management the OECD and Eurostat stress the discontinuity of innovation whereas a worker level study might rather uncover the incremental improvements in routines that will happen assuming that the incentives of workers and the firm are aligned. But when may such change be an innovation? The Oslo manual as well as Knight (1967) both use new-to-the-firm as the delimitation between change and innovation. But other studies, such as those referenced in section 1.3, use more normative demarcations referring to the magnitude of change; e.g. distinguishing between substantial change and other change. Scheinstock (2004) pp. 146-148 discuss these and similar criteria in more detail and arrives at the conclusion that definitions of organisational innovation will always be subjective but that this is not necessarily a problem: the interest of the researcher may lie in whether the organisation is perceived by its members to have undergone change. Of course, this makes it practically impossible to study the effect of the diffusion of a specific innovation.

According to Edquist et al. (2001), pp. 174-175 one of the reasons why organisational innovation is difficult to identify empirically (and objectively in particularly) is that it is not commoditised: there are no intellectual property rights and no formal R&D investment. The problem of defining organisational innovation objectively is taken up by the evolutionary studies of section 1.4. If types of organisations are to be defined objectively then statistical data reduction techniques will be important tools. But which types will be identified varies according to the sample that is analysed; no two samples will produce the same results. This leads to the question of how to determine which types of organisation are sufficiently similar to be grouped together and which organisations should be placed in between types as undergoing development. Note that "organisations undergoing change" will be merely another type and thus recreates the same problem; it amounts to a problem of infinite regress.

Even objective statistical techniques will ultimately rely on subjective judgement. There does not seem to be an incontestable way of measuring organisational innovation; the aim of any given analysis should determine how it is measured. The more aggregate the aim, the more abstract the measure of organisational innovation should be chosen.

The final section of this report compares the various contributions discussed across a number of dimensions, not least the measuring dimension.

Table 1: Summary of literature survey

Section of report	*1.1*	*1.2*	*1.3*	*1.4*
Stylised description	Adoption of practices	Pervasive change	Abstract change	Evolutionary change
Nature of change	Change of organisational structure or management process	Change of archetype	Change of structure	Fundamental change even including external links
Novelty criterion	New to the firm	New to the firm	Subjective assessment of respondent	Continuous change
Data material	Survey and follow-up interview	Survey and possibly interview	Survey	Detailed longitudinal data
Main results relate to	Management / strategy and environment / competition	Management and competitors / collaborators	Skill-bias and national institutional set ups	Management and co-evolution of environment

1.5.3 Summing up

Table 1 sums up and compares the results of the various strands of research on organisational innovation identified in this survey. The top row provides reference to the sections of this report in which each strand is discussed while the second row provides a stylised heading. The third row describes the nature of change studied within each strand. An interesting point of comparison is that the literature on abstract change tend to have a quite narrow focus, as the wording of survey questionnaires often only ask whether the structure of the organisation has undergone non-trivial change, while leaving out references to management processes or external relations.

The fourth row provides the novelty criteria for each strand. The first two strands both employ a new-to-the-firm criterion: whether or not the adoption of a practice or the transformation into an archetype is judged to be an organisational innovation solely depends on the previous state of the organisation; while the strand on abstract change assigns the establishment of the criterion for innovation to the respondent and the evolutionary strand has a focus on what could be termed "first differences", i.e. on continuous change rather than on discrete change.

The fifth row implicitly sorts the strands according to generalisability by listing the typical sources of data. The studies of adoption of specific practices need to be focussed on narrow industrial sectors as the practices on the list will have to be relevant to each organisation in the sample; and the practices have to be understood in a similar manner at each organisation of the sample. In a similar manner not all archetypes are relevant for all organisations: it would be unreasonable to expect service firms to develop a structure for just-in-time

production. Studying organisational innovation in an abstract sense is relatively generalisable, but as discussed by Drejer (2004) there seem to some evidence that service firms tend to accept more everyday change than manufacturing firms; i.e. they tend to report less organisational innovation when probed in surveys. The strand of literature on evolutionary change is the least tangible but thus also the most generalisable approach. Empirically studying continuous change however, sets high requirements to the data material as well as to the methodological considerations, as is discussed in section 1.5.2, and may rarely be feasible.

The final row of table 1 highlights the areas in which the approaches show consistent results. Asides from the more generalisable approaches generating results of a more aggregate character, there is quite a consistent tendency among the results: management and context, in the sense of markets as well as non-market institutions, are the factors that matter for organisational innovation. Competition is found to be a catalyst of organisational innovation and the direction in which firms are often found to change is towards more functionally flexible structures, as if in anticipation of further requirements for organisational change. From a policy perspective this means that in order to provide fertile conditions for organisational change and thus for increased competitiveness, a supply of highly educated and highly adaptable workers must be established. And policy makers must ensure that all workers are part of this supply or risk polarisation in the labour markets.

Management is found to be the source of organisational innovation, but thus also a possible constraint on organisational innovation and a change of management may be necessary for successful organisational innovation. This means that institutional arrangements must include incentives structures that make managers leave when they no longer contribute to the development of the organisation. The research on organisational innovation thus provides an argument for the presently unpopular severance pay: managers need an incentive to leave, or at least to mitigate the incentive to linger in a management position. On the other hand, the research also provides an argument for the more popular idea of making managers accountable to shareholders: owners must actively monitor management and replace it when necessary.

A final point concerns the importance of studying organisational innovations. They may be intangible and difficult to define empirically but they matter to economic development, and even more so as service sectors come to dominate the economic system. It is always difficult to distinguish process innovations from organisational innovations, as the book by Edquist and colleagues show (Edquist et al., 2001). But in service sectors, where the product is delivered in the same instance as it is produced, this problem is even bigger and there is a need to understand these organisational innovations.[14] Even in the more traditional manufacturing sectors, the importance of organisational innovation cannot be ignored; as described in section 1.3 there are several studies showing organisational innovation to be the driving force of skill biased development and labour market polarisation. Policy makers may thus also benefit from a deepened understanding of organisational innovation.

[14]This is discussed at length by Drejer (2004).

2 Empirical evidence and harmonised measures of organisational innovation

There is no doubt that organisations change continuously and the survey of the literature in section 1 above has pointed to the variety in the meaning of the term "organisational innovation" from one research project to another. Some studies (e.g. Daft (1978) or Bolton (1993)) study organisational innovation as a very concrete phenomenon. They specify certain criteria, such as whether the organisation is part of an R&D consortium or not, for organisational innovation to have taken place. Such studies allow for detailed analysis of the effects of organisational innovation but are relatively narrow in scope: the adoption of a specific organisational trait (or a trait from a list of traits) will only be applicable to a certain group of firms, typically what is otherwise identified as an "industry".

Other studies take an approach in which the definition of organisational innovation is less specific. Instead of determining what constitutes organisational innovation beforehand an organisation is judged to have undertaken an organisational innovation if it has undergone non-trivial change. This approach thus relies on the respondents of surveys to define the concept of organisational innovation subjectively, but the result is a more generalisable approach to organisational innovation that allows for more aggregate studies. Piva et al. (2005) and Lundvall and Kristensen (1997) are examples of studies using this approach.

This second part of the report presents some of the currently available empirical evidence of organisational change in European firms. The report will attempt to identify trends in organisational innovation in the firms of the European nations and assess the extent to which theoretically sound indicators can be constructed from the currently available sources of data. Currently available sources of data is a very vague term and the focus here will be on the 3^{rd} and 4^{th} Community Innovation Surveys (CIS3 and CIS4 respectively) undertaken by Eurostat in 2001 and 2005 with questions referring to the years 1998-2000 and 2002-2004 respectively (Eurostat, 2006) along with the 3^{rd} and 4^{th} European Working Conditions Surveys (EWCS3 and EWCS4 respectively) undertaken by the European Foundation for the Improvement of Living and Working Conditions in 2000 and 2005 respectively (Paoli and Merllíe, 2001; Parent-Thirion et al., 2007). The insight into organisational change and innovation that can be derived from these sources will be compared to the trend development reported in the European Innovation Scoreboard 2007 (UNU-MERIT, 2008).

2.1 The Community Innovation Surveys

The methodological backgrounds for the CIS3 and 4 are the 2^{nd} and 3^{rd} editions of the Oslo Manual respectively (Eurostat, 2006); the differences among these two editions of the Oslo Manual thus entails that the results of the two waves of the CIS are not directly comparable.

2.1.1 The Oslo Manuals

In the 2^{nd} edition of the Oslo Manual (OECD/Eurostat, 1997) organisational innovation is deliberately left out of the primary text. It is argued that organisational innovation is widespread and that it may result in significant improve-

ments in firm performance (§21), but that it is difficult to define conceptually as well as in practice, and that it is highly firm specific (§120). Nevertheless, guidelines to a definition of organisational innovation are given in §156 and discussed further in annex 2.

Organisational innovation is defined in the 2^{nd} edition of the Oslo Manual as including, but not limited to (§156): '*the introduction of significantly changed organisational structures, the implementation of advanced management techniques and the implementation of new or substantially changed corporate strategic orientations.*' This is the definition used in CIS3.

With the 3^{rd} edition of the Oslo Manual (OECD/Eurostat, 2005) the scope of the manual widened from covering only technological product and process innovation to also including organisational and marketing innovation. The definition of an organisational innovation is given in §177: '*An organisational innovation is the implementation of a new organisational method in the firm's business practices, workplace organisation or external relations.*' It is emphasised (§179) that the difference between organisational change and organisational innovation is that the latter must be new to the firm and initiated deliberately by management.

The definition of organisational innovation in the 3^{rd} edition of the Oslo Manual is quite different from that given above of the 2^{nd} edition of the Oslo Manual. Compared to the definition from the 2^{nd} edition, the definition of the 3^{rd} edition includes changes of management techniques, which are understood as business practices (OECD/Eurostat, 2005, §180), but it does not include changes of strategic orientation (which are not discussed explicitly but seem to be included in the definition of marketing innovations (OECD/Eurostat, 2005, §171). Changes in external relations, however, are included in the 3^{rd} edition definition but not in the earlier definition.

2.1.2 Comparing CIS3 and CIS4

Keeping these differences in the definition in mind the percentages of firms reporting in CIS3 and 4 to have undertaken organisational innovation are reported in table 2.

The fourth and fifth columns of table 2 show the rankings according to share of firms having undertaken organisational innovation of the 21 countries for which data is available from both surveys.

From the bottom row of table 2 it is seen that both surveys indicate that about one third of European firms undergo organisational innovation within a three year period (33% in 1998-2000 and 35% in 2002-2004).[15]

[15] There is some difference in the public availability of the CIS3 and CIS4 data from the Eurostat web page. For CIS3 data the number of firms having implemented a new strategy, the number of firms having implemented a new management technique and the number of firms having implemented a new organisational structure are available. But data is not available on the number of firms having implemented at least one of these. Regarding CIS4, however, data is only available on the number of firms having implemented change on at least one of the dimensions: business practice, workplace organisation and external relations. The percentage reported for CIS3 are those having implemented a new organisational structure. In addition, there is also some discrepancy in the aggregates available to the public. The highest sector level aggregate available for CIS4 is the core NACE, i.e. it excludes construction and some services. For CIS3 data at the core NACE level is not available but the complete aggregates across all sectors are.

Country	*Pct.*		*Rank*	
	CIS3	*CIS4*	*CIS3*	*CIS4*
Austria	44.85	49.39	3	4
Belgium	40.14	39.36	6	9
Germany	50.01	54.76	2	3
Denmark	20.33	57.93	15	2
Spain	32.11	28.23	11	13
Finland	31.75	.		
France	8.14	36.98	19	10
Greece	27.38	39.74	12	8
Ireland	.	50.48		
Italy	32.99	32.79	8	12
Luxembourg	57.37	59.08	1	1
Netherlands	25.87	27.32	13	14
Portugal	35.45	41.32	7	6
Sweden	38.43	.		
UK	33.33	.		
Bulgaria	3.44	11.64	21	21
Cyprus	43.68	43.48	5	5
Czech Rep.	20.43	36.66	14	11
Estonia	32.28	40.46	9	7
Hungary	11.38	20.31	17	19
Lithuania	13.28	25.03	16	15
Latvia	19.50	.		
Malta	8.97	21.58	18	17
Poland	.	20.98		
Romania	44.68	16.03	4	20
Slovenia	38.19	.		
Slovakia	7.97	21.44	20	18
Iceland	37.08	.		
Norway	32.23	24.09	10	16
Survey total	33.04	35.14		

Source: The Eurostat web page

Table 2: Organisational innovation in the CISs

Another indicator that despite of the differences in the definition of organisational innovation, the phenomenon seems to be equally common in 1998-2000 and 2002-2004 is that the rankings are very similar. Of the 21 countries for which data is available for both surveys only four have moved more then 4 places up or down. These are Denmark (+13 places), France (+9 places), Norway (−6 places) and Romania (−16 places). Whether this development reflects some underlying trend or is caused by the differences in availability of data and definition of organisational innovation can, of course, not be determined.

Of the five countries in which organisational innovation is the most common four are the same in both surveys (Austria, Germany, Luxembourg and Cyprus), and of the five countries in which organisational innovation is the least common four are also the same in both surveys (Bulgaria, Hungary, Malta and Slovakia). Whether this means that organisational innovation is relatively common in west central Europe, relatively rare in south eastern Europe and that there are large differences in the Mediterranean is questionable. The result is definitely biased by the difference in definition, the format of the available data (cf. footnote 15) and the quite large number of countries that cannot be included in the rankings.

Despite these problems in unambiguously interpreting the results from CIS3 and CIS4, it is important to emphasise that the definition of organisational innovation in the Oslo Manual is based on sound theoretical arguments and is generalisable to both of the approaches outlined in section 2. For studies focusing on the aggregate level, where the respondents are typically asked whether their organisation has undergone organisational innovation, the Oslo Manual provides guidance for the use of more specific questions than the broad question 'has your organisation undergone significant structural change?' which is the basis of the summary results from CIS4 published on Eurostat's web page. For studies focussing more narrowly on specific changes (e.g. the decision to join an R&D consortium) the Oslo Manual offers guidelines for which changes to label as organisational innovations – as an example; joining an R&D consortium would be a change of external relations and thus an organisational innovation according to the 3^{rd} edition of the Oslo Manual.

There are, however, arguments that the demarcation between change and innovation used in the Oslo Manual (new to the firm and a consequence of a strategic decision) could be misleading. In section 2.2 the data from the European Working Conditions Surveys will be presented. This may be interpreted as providing indicators of the diffusion of such organisational practices as teamwork or managerial practices such as delegation of responsibility and authority; but as the EWCS data are collected at the employee-level through interviews conducted at the employee's home, they can show neither whether the changes are new to the firm nor whether they are the result of strategic managerial decisions-making.

2.2 The European Working Conditions Surveys

The Oslo Manual distinguishes organisational change from organisational innovation by the latter being new to the firm and the result of a strategic management decision. But is there any guarantee that the decisions of management have the intended impact 'on the shop floor'? Or that work processes at the shop floor are not changed significantly in a more or less spontaneous manner; e.g. that employees do not themselves find out that they can improve their work

by collaboration?

This problem is taken up by Scheinstock (2004), who also argues that differences in the frames of reference for managers and workers mean that what is considered a change of work practices by workers may not be by management and vice versa. It may thus be argued that to find out whether business practices, workplace organisation or external relations have changed researchers need to ask the people involved on an everyday basis in the processes; not their superiors.[16]

The EWCSs are, indeed, just such surveys. But they are not aimed at organisational innovation and the questionnaires do not refer to change over some period of time. Instead, respondents are asked 'whether their main paid job involves...' and to study organisational change, one thus has to rely on studying the changes in aggregates between two waves of the EWCS. E.g. one may compute the share of workers whose jobs include teamwork in the EWCS3 and 4 and thereby get an idea of the change in the diffusion of teamwork in the intervening years. Note that it is the diffusion in the population of workers that may be studied from the EWCSs, not the diffusion among firms. That 20% of workers experience teamwork is not the same as 20% of firms employing teamwork in their organisation.

2.2.1 Work practices

The EWCS4 contains no less than 31 countries but the EWCS3[17] covers only the EU-15, and so a comparison of these two surveys is restricted to these 15 countries.[18] Table 3 shows the diffusion of four work practices in 2005 (i.e. in the EWCS4) as a percentage of workers experiencing the practice along with the percentage point change since 2000 (i.e. in the EWCS3) in parenthesis. The diffusion of numerous practices can be illustrated in this manner and the four chosen are designed to capture the extent to which work involves the exercise of discretion as well as on-going problem-solving activity on the part of the employee.[19] These are often considered key features of learning organisations (see Jensen et al. (2007)). The four practices included in table 2 are:[20] "doing work in teams", "being able to chose or change the method of one's work", "assessing oneself the quality of one's work" and finally: "one's work pace being

[16]Note that this is the definition of organisational innovation in the third edition of the Oslo Manual. The argument, of course, also holds for other definitions.

[17]The survey questionnaire of the EWCS3 was directed to approximately 1500 active persons in each country. The total survey population is 21703 persons, of which 17910 are salaried employees. The analysis presented below is based on the responses of the 8081 salaried employees working in establishments with at least 10 persons in both industry and services, but excluding agriculture and fishing, public administration and social security, education, health and social work, and private domestic employees. The analysis conducted on the basis of the EWCS4 uses the same size and sector restrictions. The EWCS4 contains around 1000 interviews per country with the exception of Luxembourg, Malta, Estonia, Slovenia and Cyprus where the number is approximately 600.

[18]Austria, Belgium, Germany, Denmark, Spain, Finland, France, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Sweden and the UK.

[19]See Arundel et al. (2007) for a related analysis linking at the aggregate level measures of innovative performance and the adoption of learning forms of work organisation for the EU-15.

[20]Given here is the wording of the questionnaire for EWCS4. The questions are: Q26.B, Q24.B, Q23.B and Q21.E in the order of table 3. The wording is almost identical in the EWCS3. See Paoli and Merllíe (2001) and Parent-Thirion et al. (2007) for details.

Country	*Teamwork*	*Autonomous Methods*	*Quality Evaluation*	*Hierarchical Control*
Austria	63.66(-5.61)	54.07(-5.86)	76.37(6.40)	36.58(-1.83)
Belgium	72.10(13.28)	70.69(14.69)	63.49(-4.84)	39.09(-5.24)
Germany	57.85(0.34)	69.18(1.59)	61.19(-8.97)	38.38(4.61)
Denmark	58.39(-6.24)	75.66(6.45)	87.40(3.54)	23.27(0.40)
Spain	48.95(-9.89)	38.90(-4.87)	60.93(-10.21)	53.07(-3.01)
Finland	75.15(10.27)	65.90(3.48)	71.53(-4.41)	16.87(-0.14)
France	50.96(-10.45)	65.16(6.26)	83.45(4.54)	43.25(-8.83)
Greece	69.42(4.76)	43.14(-0.35)	63.49(11.72)	69.82(1.98)
Ireland	73.73(-4.29)	60.29(11.12)	72.75(0.91)	41.96(-20.32)
Italy	54.89(13.17)	60.03(2.54)	72.68(10.30)	37.71(-5.70)
Luxembourg	72.47(-0.23)	66.56(5.35)	79.42(13.71)	44.96(4.25)
Netherlands	73.48(6.47)	68.89(-12.13)	69.15(-12.75)	23.99(10.34)
Portugal	59.29(-7.40)	59.33(10.37)	71.80(1.20)	70.29(14.16)
Sweden	68.14(11.46)	86.90(6.12)	70.12(-2.09)	18.59(-1.82)
UK	73.49(-6.86)	57.57(-5.51)	72.54(-3.80)	57.85(2.14)
EU-15	61.19(-1.67)	62.62(0.13)	70.33(-2.51)	43.59(0.62)

Pct of workers reporting organisational traits in 2005 (pct point change since 2000)
Source: 3^{rd} and 4^{th} EWCS

Table 3: Organisational innovation in the EWCSs

subject to direct control of one's boss".

At the aggregate level (EU-15) there has not been much change in the diffusion of these four work practices. But there are some very large changes in individual countries. Without any normative criterion for studying the diffusion of organisational practices it is not possible to say which countries have undergone a desirable development and which have undergone less desirable development. It may be observed that in e.g. Germany and Denmark there seem to have been relatively little organisational innovation (low change in diffusion), but the development in these two countries have nonetheless been very different: German organisations have changed towards less responsibility to the individual and more hierarchical control; while in Denmark organisational innovation has lead to less use of teamwork but more autonomy and responsibility to the individual worker.

2.2.2 Organisational archetypes

The measures reported in table 3 are only a small subset of those available from the EWCSs and there may be better proxies of the use of innovative forms of work organisation (e.g. responsibility awarded to the individual worker, or whether one's work involve learning new things). One approach to interpreting the diffusion of a large number of organisational traits is to use data reduction techniques and construct archetypes of organisational forms that can be interpreted as representing certain groups of traits. Such a grouping of the EWCS3 and 4 data has been undertaken by Lorenz and Valeyre (2005) and Valeyre et al.

(2007), though not with the aim of studying changes in diffusion between the two surveys. In fact, one must we very careful when interpreting changes in diffusion of archetypes based on data reduction techniques. For example, the Taylorist form of work organisation that emerges from the 2000 data is similar to Taylorist work organisation that emerges from the 2005 data in the sense that they are both characterised by low autonomy and few cognitive challenges for workers along with the use of teamwork, job rotation, monotonous and repetitive tasks and a multitude of constraints on the pace of work. But the Taylorist organisation of 2000 does not use e.g. teamwork to the *same* extent as the 2005 Taylorist organisation.

Asides from Taylorist work organisation three other archetypes are identified: "Discretionary learning" is a form of work organisation that is basically the opposite of Taylorist organisation. Workers have autonomy and are subject to cognitive challenges while they rarely experience work pace constraints or monotonous and repetitive tasks. "Lean" work organisation combines Discretionary learning and Taylorist organisation. Workers experience cognitive challenges, work in teams and have job rotation but also face work pace constraints and monotonous and repetitive tasks. The fourth archetype of work organisation is called "simple" and is characterised by workers experiencing few cognitive challenges, low autonomy, rarely work in teams, rotate jobs or face monotonous or repetitive tasks and have few work pace constraints.

The focus here will be on the discretionary learning (DL) and lean types of work organisation. These two types may collectively be called "learning" organisations, as their common focus on cognitive challenges for workers sets them apart from the Taylorist and simple forms of work organisation. Table 4 shows the share of workers working in learning organisations in 2005, the absolute change in this share since 2000, the ratio of DL to lean organisations in 2005, the absolute change in this ratio since 2000 and the ranking of the 15 countries according to share of learning in 2005 and change since 2000.

For the EU-15 in aggregate, organisational innovation between 2000 and 2005 has lead to the share of workers working in learning organisations decreasing by 2.17 percentage points. However, this aggregate development is almost solely caused by relatively large drops in the share of workers in learning organisations in the UK and Spain. On average the DL type of organisation is more widespread than the lean type of organisation (a ratio of 1.62 in 2005) and the DL type is increasing its dominance.

Sweden stands out from the rest of the countries. It has the highest share of workers in learning organisations, the largest absolute increase in this share and the highest ratio of DL to lean for any country. Asides from Sweden there seems to be some catching up going on: the second, third and fourth countries in the ranking according to share in 2005 (Denmark, the Netherlands and Finland) all have some of the lowest changes in this share, while the second, third and fourth countries in the ranking according to change in share (Greece, Italy and Ireland) still have some of the lowest shares of workers in learning organisations in the EU-15.

It is interesting to note that in all of the latter three countries, lean organisation is more widely diffused than the EU-15 average, but in all three the balance is shifting towards DL organisations.

The Netherlands also shows an interesting development. It is the country with the third largest share of workers in learning organisations in 2005, but the

Country	*Learning Organisations*	*DL vs. Lean ratio*	*Rank, learning*	*Rank, growth of learning*
Austria	69.64(0.68)	2.11(-0.10)	7	8
Belgium	67.92(3.96)	1.76(0.21)	9	6
Germany	64.26(0.40)	2.23(-0.03)	10	10
Denmark	82.27(0.41)	2.04(-0.70)	2	9
Spain	45.22(-13.72)	0.84(0.32)	15	15
Finland	74.79(-0.62)	1.50(-0.23)	4	12
France	71.54(0.30)	2.00(0.86)	6	11
Greece	53.09(8.72)	0.82(0.09)	14	2
Ireland	68.20(6.45)	1.34(0.71)	8	4
Italy	60.83(7.15)	1.53(0.26)	12	3
Luxembourg	72.34(4.19)	1.44(0.25)	5	5
Netherlands	75.88(-5.40)	2.12(1.60)	3	13
Portugal	55.23(1.03)	0.82(-0.11)	13	7
Sweden	83.52(12.40)	4.23(1.40)	1	1
UK	64.12(-11.27)	0.98(0.12)	11	14
EU-15	65.16(-2.17)	1.62(0.23)		

Col. 2: Learning organisations in 2005 (change since 2000)
Col. 3: DL to Lean in 2005 (absolute change since 2000)
Source: Based on the 3^{rd} and 4^{th} EWCS

Table 4: Learning organisations in the EWCSs

share has decreased by 5.4 percentage points since 2000. However, the Netherlands has seen an impressive increase in the DL to lean ratio over these five years indicating that the context for organisational innovation in the Netherlands in this period highly favoured the DL form of work organisation while being unfavourable for the lean type of work organisation.

Much research is being done on why some types of work organisation are diffused differently in different countries, and the study of organisational innovation is an important part of this research, as it is important to develop models of the relationship between the direction of evolution of organisational forms and the institutional set up in which this evolution takes place (Lam and Lundvall, 2006). The EWCSs suggest that not only are the diffusion patterns different, but the direction of evolution also differs across countries: Some seem to be converging while others are definitely not part of this pattern.

In the final section of this report the EWCS data will be compared to the CIS data and the European Innovation Scoreboard in order to give a tentative idea of the pattern of organisational innovation in Europe.

2.3 Comparison

When eye-balling tables 2 and 4 one cannot help but notice that there seems to be some correspondence between the countries in which many firms report in the CIS to have undertaken organisational innovation and the share of workers working in learning organisations. To study this relationship further the ranking will be compared to the European Innovation Scoreboard (EIS).

2.3.1 The European Innovation Scoreboard

The aim of the EIS is to provide '*a comparative assessment of the innovation performance of the EU member states.*' (UNU-MERIT, 2008, p. 5). Each year a new report is released, but the updates relative to the previous year pertains as much to methodology as to the data. The EIS is based on a multitude of indicators from Eurostat, including CIS data, and not all of these series are updated on a yearly basis.

The ranking of countries in the EIS is therefore not only reported for one year at a time. In each report the ranking for the previous years is undertaken retrospectively using the most recent methodology. Here, the 2005 ranking from the 2007 report (UNU-MERIT, 2008) will thus be used. This ranking does not differ much from the 2005 ranking of the 2006 report (UNU-MERIT, 2007) or the 2005 report (UNU-MERIT, 2006).

Table 5 reports the 2005 ranking according to the EIS 2007 report, the ranking of the CIS4, as also reported in table 2, and the ranking according to diffusion of and change in diffusion of learning organisations according to the EWCS3 and 4, as also reported in table 4. As the EWCS3 only covers the EU-15 table 5 is also restricted to these countries.

It is quite difficult to discern any relationships between the four rankings of table 5. The correlations between these rankings have therefore been computed.[21] These are presented in table 6 for the 12 countries for which data

[21] As the four variables in table 5 are rankings they are clearly not normally distributed and the assumptions of the common Pearson correlation coefficient are violated. The Spearman rank correlation, which is non-parametric, has been computed instead.

Country	*EIS2007 rank for 2005*	*Most innovations, 2002-04*	*Learning share, 2005*	*Increase in share, 2000-05*
Austria	11	5	7	8
Belgium	8	8	9	6
Germany	4	3	10	10
Denmark	2	2	2	9
Spain	13	11	15	15
Finland	3		4	12
France	10	9	6	11
Greece	14	7	14	2
Ireland	7	4	8	4
Italy	12	10	12	3
Luxembourg	6	1	5	5
Netherlands	9	12	3	13
Portugal	15	6	13	7
Sweden	1		1	1
UK	5		11	14

Note that Ireland was not included in the ranking in table 2
Source: 3^{rd} EWCS, 4^{th} EWCS, 4^{th} CIS and EIS 2007

Table 5: Innovation Ranking

is available. The labels "EIS", "CIS", "EWCS" and "ΔEWCS" refer to the variables of table 5 in the same order.

As is seen, the correlation between overall innovation performance and the percentage to report in the CIS to have undertaken organisational innovation is positive, and so is the correlation between the innovation performance and the share of workers in learning organisations. However, the increase in the share of workers in learning organisations is not correlated with any of the other variables. In particular, it seems that there is no catching up taking place, as was hypothesised in section 2.2.2: the correlation between EWCS and ΔEWCS has the right sign but it is not statistically significant.

The statistically significant correlations of table 6 are highlighted in bold. They suggest that the European economies where a large share of workers are

	EIS	*CIS*	*EWCS*	*ΔEWCS*
EIS	1.000			
CIS	**0.587**	1.000		
EWCS	**0.699**	0.322	1.000	
ΔEWCS	-0.133	0.308	-0.224	1.000

Spearman correlation coefficients, n = 12, values in bold are significant at the 5% level

Table 6: Rank correlation coefficients

	EIS	*CIS*	*EWCS*
EIS	1.000		
CIS	**0.754**	1.000	
EWCS	**0.626**	0.274	1.000

Spearman correlation coefficients, n = 23, values in bold are significant at the 1% level

Table 7: More rank correlation coefficients

in learning organisations or where organisations relatively often undergo organisational innovation are also those with the best innovation performance.

As the CIS data is also used in the European Innovation Scoreboard one may suspect that the correlation between EIS and CIS in table 6 is a tautology. Of the 25 indicators, which go into the European Innovation Scoreboard, one is the share of small and medium sized enterprises that undertake organisational innovation. It may thus be expected to have a negliable effect on the overall index.

If ΔEWCS is left out of the correlation matrix the data is no longer restrained by the limited coverage of the EWCS3 and all the countries for which CIS4 data is available may be included (cf. table 2). This has been done in table 7 which includes 23 countries, whereas table 6 only includes 12 countries.

The results are not much different. The correlation between CIS and EIS increases somewhat and the correlation between CIS and EIS and between EWCS and EIS become significant at the 1% level.

There are a number of possible interpretations of the low correlations between CIS and EWCS (and also ΔEWCS) in tables 6 and 7: Countries where a large share of organisations undergo organisational innovation are different from those where a large share of organisations are learning organisations and different from those countries where many organisations are becoming learning organisations. Alternatively, the (missing) correlations may be seen as an indication of the difference between directing surveys at the workers themselves compared to managers/representatives of the organisation; when a work practice is being diffused within a firm it will affect more workers and thus show up in the EWCS statistics without actually being new to the firm. Last but not least, it must be remembered that there are some difference in the reference years for the various sources of data.

A possible conclusion is that the EWCS, directed at workers, uncover the continuous evolution of work organisation towards learning forms; whereas the CIS, directed at managers/representative, uncover propensity for conscious, discontinuous change of organisational structures – and these two measures are not correlated. This interpretation is rather far-reaching and the evidence provided here is tentative at best; it must also be kept in mind that the definition of organisational innovation in the CIS4 (cf. the 3^{rd} edition of the Oslo Manual) is quite different from the indicator of organisational change created by comparing the EWCS3 to the EWCS4.

The tables presented in this section do not provide for any unambiguous conclusions regarding the merits of one definition of organisational innovation

versus others. The analysis has an exploratory nature. There may be theoretical arguments for why the CIS and EWCS provide different pictures of organisational innovation, or the measures/surveys may simply be too different from each other. This highlights the original problem of this report: the need for a harmonised measure of organisational innovation.

2.3.2 A harmonised measure of organisational innovation?

Change is of course always relative to what is in existence. Just as no single measure of technological innovation can be constructed without taking into account the details of the technology being studied, so organisational innovation must take into account the specificities of the subject of the study. What can be harmonised, however, are the boundaries of organisations; i.e. the domain in which changes can be seen as organisational innovations.

It is straightforward that the organisation of work is part of this domain, but once it is recognised that the influence of an organisation's management stretches beyond the legal unit that defines the organisation, e.g. in the case where the management of a firm is capable of affecting the organisation of work at the firm's suppliers, the delimitation of the organisation is no longer obvious. Most empirical studies focus on work practices and/or management techniques and so sidesteps this issue, but others, e.g. Child (1972), argue for the interrelatedness of organisational evolution and the evolution of the context of the organisation. It is thus noteworthy that the 3^{rd} edition of the Oslo Manual explicitly includes changes in external relationships as part of organisational innovation.

While the Oslo Manual provides a possible definition of organisational innovation, the implementation in the CIS seems to have focussed on creating a cross sectional dataset; but for data to be used in research, consistency across time is as important as consistency across countries. The CIS data in its present state cannot be used for time series analysis of organisational innovation. Though, now that the Oslo Manual in its 3^{rd} edition explicitly includes organisational innovation, it seems likely that future waves of CIS (the CIS is scheduled to be undertaken every second year in the future (Eurostat, 2006)) will allow for analysis over time.

The EIS, on the other hand, explicitly focuses on comparing (national) performance over time; its approach, to compute retrospective index values for countries in earlier years when a new method is introduced, allows the researchers to compare the performance of nations over a handful of years. Could something similar be done for organisations? Probably not. The researchers behind the EIS enjoy the advantage of having a multitude of different sources of data to rely on; not just national statistics but also various European surveys allowing for the construction of nation level indices. Finding firms that are common to just two survey or registry databases is difficult, meaning that we cannot expect to enjoy the same methodological freedom at the organisational level as researchers enjoy at the national level.

Turning now to the EWCS, we see that it has what the CIS lacks: Consistency over time; the questions of earlier waves of the EWCS are mostly repeated in the later surveys. The EWCS is therefore a source of consistent data across countries and over time of the diffusion of various organisational traits. But the organisational traits that may be studied using the EWCS are rather limited

in scope: it includes work practices, but only to a limited extent management techniques and not external relationships at all.

The organisation of a firm is as unique as the goods and/or services produced by the firm. Depending on the aim of the study being undertaken, as mentioned in section 2, it may be studied whether a specific practice/method has been adopted, keeping in mind that such a study is limited to the firms that might actually use the practice/method in question; or it may in a more abstract way be studied whether the organisation has changed along the dimensions that are identified as the boundaries of the organisation. In any case, it is important to apply the same methodology across countries for comparability, but consistency in time is at least as important. The concepts of change and innovation have an inherit time dimension and a continuous nature; it cannot be fully understood from cross section data only.

A universal definition of organisational innovation for data gathering is probably not possible. The best that researchers can hope for is that data will be gathered using the same delimitation of the domain of the organisation. As such the Oslo Manual is a useful contribution. The Oslo Manual does not, however, touch upon the problem of differences in frame of reference for managers and workers – or of any other observer of the organisation. The role that an organisation fulfils for an individual determines the perspective of the individual towards the organisation and thus which changes she will judge to be organisational innovation and which changes she will not notice. This is the area in which a harmonised approach is still lacking.

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