

Measuring Intangible Investment

The Challenge of Measuring and Evaluating Organisational Change in Enterprises

by

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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THE CHALLENGE OF MEASURING AND EVALUATING ORGANISATIONAL CHANGE IN ENTERPRISES

1. Why are new surveys needed?

One of the lessons the 1980s has been that to gain the improvements in productivity and innovation that were hoped for from investments in new technology, considerable further investments were needed in human resources and reorganisation of firms internally and in their external relations. This belief was borne out in a wide diversity of anecdotal case studies, and carried forward in a rapidly growing case study literature from management and business consultants and work at business schools. These demonstrated that good business performance increasingly depends not only on having satisfactory initial endowments of intangible and tangible assets, but also on the capacity to adapt to changing conditions by continuously renewing, reconfiguring, and redeploying these assets. This suggested that how enterprises adapted, including through reorganisation, is increasingly important in determining how well they perform.

Organisational changes were designed to meet two major challenges: absorbing technology and using it to deal with growing global competition. Firms have restructured their operations to better respond to these competitive pressures. Firms can reorganise in two main ways: they can restructure internally, for example by changing workers' responsibilities and tasks and altering the relationships among them, or they can restructure externally and change responsibilities and relationships among firms, for example by making greater use of external market purchases of goods and services. Because firms may combine these methods, both internal and external reorganisation are often treated together. Economic restructuring also takes place through the birth and growth of new firms and the contraction and death of existing firms. This turbulence is not investigated directly in the work presented here but this birth/death, growth/contraction turbulence remains an important aspect of economic adjustment.

The relationship between firm organisation and technology

The underlying hypothesis is that technology provides new opportunities for expanding the range of goods and services, increasing productivity and employment, but that firm organisation and the institutional context for the introduction of organisational change determines the effectiveness and impact of the adoption of new technologies and of organisational change itself. As is pointed out in the *Technology, Productivity and Job Creation* report, Chapter 2 (OECD, 1996a), the links between technology and productivity gains have been much discussed and many explanations have been put forward to address the contradictions observed in the past between the widespread introduction of new technologies, particularly information technologies, and the productivity slowdown (the "Solow paradox"). Factors related to organisational structures, skills and worker training, and managerial ability are increasingly cited as underlying this apparent contradiction.

Without appropriate organisational structures, a skilled workforce and able management, new technologies do not have the desired impact on output and productivity, and on employment. Furthermore, many firms adjust to greater competition by reorganising their activities to improve product quality and production flexibility (variety, rapid market adjustment), and this may not appear in simple output or productivity measures. Organisational change and changes in skills and management abilities are essential to capturing firm-level quantitative and qualitative benefits from the introduction of new technologies (see, for example, OECD, 1991*a*). Although the organisational structures being adopted present similarities, firms do not quickly and easily adopt new technologies and reap the benefits of adoption. Considerable differences in organisational structures, skills, and managerial abilities across firms, sectors, and countries shape how technology is introduced and how it affects output and employment. Some of these similarities and differences are discussed below, particularly in terms of sectoral differences and differences in firm adjustment strategies in various countries.

However despite the plethora of partial information, there was very little consistent information on the ways in which enterprises were adapting, how this depends on the firm's activity, factor and product market conditions, and the impacts of the larger context of public policies and institutional arrangements. This paper first reviews what kind of information is available (Part 2), the picture these surveys give of organisational change (Part 3), the analytical results of impact analysis based on these surveys (Part 4), and then reviews this experience in the light of development of new indicators (Part 5).

2. What surveys are available?

There are many obstacles to developing an empirical basis for discussing changes in strategy, structure, technology, workplace organisation, and human resource management in enterprises and their relationship to each other and to enterprise performance. At a conceptual level, no unifying theory embraces these different aspects satisfactorily. At the empirical level, there are three kinds of barriers.

First, there is a lack of representative national data on certain variables (such as changes in work organisation or volume of training). Although some statistics are available on the use of technology and on formal training (see OECD 1991*b*, for example), statistics on changes in work organisation or on-the-job training are either unavailable or apply to narrow sectors. Statistics for non-manufacturing are more limited than for manufacturing.

Second, even where data on particular variables exist (on wages or investment in information technology, for example), they are usually collected in separate, narrow surveys covering wages, salaries and labour costs, employment or investment. Furthermore, data on variables such as labour costs are best collected from employers (establishments or enterprises), while data on variables such as worker qualifications best come from individuals (labour force or household surveys, population census). As a result, even at detailed levels of disaggregation, analyses are unable to control for a range of unobserved differences among enterprises or individuals. In some countries, it is possible to link data on individuals or employers from different sources (surveys, tax records, administrative records). The coverage of variables is uneven however, and the process may be expensive and constrained by the need to protect confidentiality.

Third, there are almost no databases that provide nationally representative statistics covering the full range of variables over time. Difficulties limiting the availability of comprehensive cross-sectional data are compounded by the difficulty of maintaining observations over time for both employers and individuals. This virtually rules out analyses that could capture cause-and-effect relationships (the impact

of new technologies on productivity), particularly where such relationships depend on sequencing and long organisational learning, or are sensitive to external developments.

Some surveys have attempted to overcome some of these shortcomings. In Denmark and France, fairly comprehensive official surveys have been carried out on technology use and organisational change in manufacturing. Through workplace and industrial relations surveys, Australia and the United Kingdom have collected, and continue to collect, data on work organisation, the introduction of technology, and some human resource management practices. The German authorities collect from an annual panel of establishments covering all sizes and sectors of the economy, longitudinal data on employment and earnings and some measures of technological and organisational change. However, despite a few exceptions, most databases are limited in their sectoral coverage, the scope and/or detail of variables within enterprises or for individuals, and/or the lack of longitudinal data.

In an effort to strengthen the statistical base for future analysis of enterprise dynamics, a number of countries, in consultation with the OECD Secretariat, have undertaken to develop more comprehensive, economy-wide surveys, with the potential for building longitudinal databases.

- Statistics Canada in conjunction with Human Resources Development Canada has designed and is testing a Workplace and Employee Survey. It is intended to collect from a sample of establishments, drawn from all sectors, data on work-force characteristics and job organisation, compensation, training, human resource functions, establishment performance, business strategy, innovation, and use of government programmes. In addition, the survey collects, from a sample of employees within each establishment, data on job characteristics, education and training, personal and family support programmes, compensation, work history and turnover. It is planned that the survey will be administered regularly to a panel of establishments.
- NUTEK, the Swedish National Board for Industrial and Technical Development, has designed and administered a one-off survey of private sector establishments in manufacturing, construction, trade, transport, and finance and consultancy services. It collected data on establishment characteristics, staff and competencies, work organisation, technology and product/service development and external relations, organisational changes, and business results.
- The Japanese Ministry of Labour and the Ministry of International Trade and Industry have jointly developed and administered an enterprise survey of organisational change and technological innovation. The one-off survey covers private sector enterprises in mining, construction, manufacturing, and tertiary industries. It collected data on the introduction of information systems; impacts on occupations, enterprise structure, work organisation, production processes and output, employment levels, skill requirements and training, pay-setting practices; barriers to innovation.
- Since 1993, the German Institute for Employment Research (IAB) has conducted an annual longitudinal panel survey of 4 200 establishments. For all sectors (private and public) and firm sizes, economic performance, employment, training, hours and earnings are measured, along with organisational changes, technological innovation and investments (IAB, 1996). The three completed surveys, particularly that of 1995, cover around four-fifths of the issues raised in the NUTEK survey. They produce interlinked indicators of firm-level functional and numerical flexibility.

Authorities in Denmark and Mexico are developing new surveys or adapting existing surveys along broadly similar lines, and new surveys are also being explored in other countries (Finland, the Netherlands, Norway). A survey focusing on workplace participation in organisational change is being carried out in 10 EU countries by the European Foundation for the Improvement of Living and Working Conditions. In mid-1996, the German, Japanese and Swedish surveys were the only new or continuing surveys covering most of the economy from which even partial results were available.

3. What can be drawn from these surveys?

The essential aim of these surveys is to describe the features of the new work organisation, its similarities and differences across different sectors, and if possible across different countries, and where possible, link these structures and changes to both performance indicators at firm level and human resource management strategies.

Stylised features of the new organisation

Restructuring appears to be occurring in many industries and services and is most advanced in manufacturing exposed to international competition and in tradable services, particularly business services. Internal restructuring is often accompanied by strategies that increase external transactions and links with other enterprises in order to reduce costs, increase specialisation, gain economies of scale and scope, and spread risk. The new work organisation practices built around and complementary to information and communication technology have often been described as “high-performance work practices” that lead to high-performance workplaces (US Department of Labor, 1993; 1994).

The new work organisation seeks greater functional and numerical flexibility and uses internal and external strategies to achieve flexibility and increase adaptability (see Box 1 for explanation of different forms of flexibility).

The new work organisation has some or all of the following features:

- more marked specialisation of enterprises or business units (focus on “core” activities);
- more horizontal inter-firm links, either for sub-contracting (purchase of parts, components, or services that are part of the unit’s final product) or for outsourcing (purchasing supporting business services, transport, cleaning, cafeteria, or other ancillary services);
- it is an essential complement to effective use of technology;
- greater importance is accorded to horizontal communication and horizontal links and less importance to vertical or hierarchical ones;
- hierarchies are increasingly flattened;
- information is gathered at more levels and is channelled less hierarchically;
- authority to act is less dependent on hierarchical models of authority;
- better use is made of better-trained and more responsive employees;

- multi-skilling and job rotation increase, blurring differences between traditional work activities;
- small self-managing or autonomous work groups are common and take more responsibility.

The organisational features, their combination, and their importance will vary according to the sector and the size of the firm, but a number of potential impacts on human resources relating to flexibility and worker effort can be broadly identified. A “core” group of long-tenured, trained employees is developed, whose flexibility is achieved through multi-skilling (functional flexibility); a group of more peripheral workers facilitates flexibility through reduced hiring and firing costs and greater flexibility of hours worked (numerical flexibility). Box 1 explains the different forms of labour flexibility in the workplace.

Box 1. Functional and numerical flexibility

Much of the literature on strategies for using labour at firm level opposes two different kinds of flexibility. *Functional flexibility* usually involves high skill and collaborative approaches to work based on high quality labour inputs. Its most common features are: shifting job design and job boundaries away from traditional narrow ones, mobility across tasks, multi-skilling and wide-skilling, extensive training and retraining. Autonomous self-managed multi-functional team work is an indicator of this kind of flexibility. *Numerical flexibility* usually involves changing a quantity of labour input. These quantitative changes include, for example, numbers of employees, hours of work, use of part-time employees, use of temporary employees whose contracts can be terminated, making use of liberal provisions on hiring and dismissals (OECD, 1986; 1989).

There is also a spatial dimension to adjustment. *Internal flexibility* refers to operations carried out within the enterprise or performed within the existing contract structure of the enterprise. *External flexibility* involves interaction in markets, generally outside the firm; it usually involves changing the nature and type of contracts. There has been much overlap between internal and functional flexibility, and external and numerical flexibility.

Enterprises pursuing more adaptable organisation and production can shift the mix of functional and numerical flexibility in order to adjust labour use. Beyond that, they can also shift the locus of adjustment, moving it outside if they have traditionally relied on internal mechanisms for adjustment, and *vice versa*.

Firms can rely on (internal) variations in working hours instead of (external) hiring and firing to achieve numerical flexibility, for example, and on outsourcing of certain activities, instead of internal occupational restructuring, to acquire certain specialised competencies. Thus, countries that typically have greater recourse to external markets and strategies that depend largely on numerical flexibility have shown greater interest in making more functional and numerical adjustments within the firm. Interest in the “high performance enterprise” and in best-practice firms in countries such as Australia, Canada, the United Kingdom, and the United States is largely about how to build functional flexibility and improve the quality of labour and other inputs. In the more protected European setting, the shift has been towards greater use of numerical flexibility and external functional adjustments. Examples are the increases in Italian self-employed, signs of increased outsourcing in German manufacturing, and the growth in temporary job agencies where they are allowed.

Education and training are more important and probably most important for core workers. Finally, wage differentiation increases as pay for performance and skills becomes more directly linked to specific business factors and employee characteristics. Other techniques such as profit sharing, rewarding

suggestions, etc., may be used to ensure high worker effort. And increased resources may also be devoted to screening potential employees.

Although much attention has been focused on these practices and their implications, the extent to which they are used and their impact have been little explored across countries. The following discussion reviews available cross-sectoral surveys in order to examine the kinds of empirical evidence and impact analysis which can be drawn from such surveys.

The extent of organisational change

If restructuring and the adoption of new practices are driven by competitive conditions, they are likely to be more evident in sectors exposed to competition and in the large firms that are more likely to be internationally oriented. This section describes the extent to which the new organisational structures and new work practices are diffusing through business firms, as evidenced in multi-firm cross-sectoral surveys.

Cross-sectoral surveys indicate widespread adoption of the new work organisation and new work practices. Overall, results are similar across a range of countries, suggesting common competitive conditions and similarities in practices; it should be noted that coverage is generally better for manufacturing than for services and that definitions of the new work organisation vary.

In the United States, large surveys of both manufacturing and services show moderately high use of flexible and new work practices. Osterman (1994) reports that 37 per cent of establishments with 50 or more employees make substantial use of flexible work practices (self-directed work teams, job rotation, employee problem-solving, total quality management). Another survey of establishments reported regular discussion of work-related problems (54 per cent), moderately wide use of total quality management (37 per cent), but less benchmarking and job rotation (Lynch and Zemsky, 1995). Half of the respondents in manufacturing and a third in non-manufacturing reported work reorganisation, the most common features of which were empowerment, training, total quality management, and profit-sharing (Bassi, 1995).

In Australia in 1990, over a third of the workplaces surveyed had introduced new technology, reorganised management structures, changed senior management personnel, and significantly restructured work practices in the previous two years (Callus *et al.*, 1992). In 1993, 25 per cent of all Australian businesses in manufacturing and 14 per cent in non-manufacturing, implemented advanced management techniques, changed management or workplace structures, or adopted enterprise bargaining (Australian Bureau of Statistics, 1995). In the United Kingdom, in 1990, almost half of establishments had adopted new financial and local non-financial communications structures (Millward, 1994). In 1992, a third of Japanese firms planned to unify divisions and sections and simplify their company structure (Ministry of Labour, 1993, Table 42). In France, almost 80 per cent of industrial enterprises with more than 50 employees reorganised production between 1988 and 1993, with major changes in almost 40 per cent. Firms that reorganised were more likely to use advanced manufacturing technology (AMT) (Table 1). In Sweden, over a quarter of a sample of industrial and service establishments or workplaces had adopted the new work organisation (NUTEK, 1996).

Table 1. **Reorganisation by firm size and technology adoption in France**

Percentage of enterprises

Enterprises	Reorganised	Not reorganised	50-199 employees	200-499 employees	500-999 employees	Over 1 000 employees	Total
Using robots or CNC machine tools	48	19	36	54	62	72	43
Introduced computer-assisted systems for:							
- stock control	66	38	56	71	64	74	60
- production management	63	27	50	65	72	77	55
- design and production	46	20	35	48	53	77	40
- maintenance management	18	6	9	20	36	52	14

Source: Fréchou and Greenan (1995).

Overall, there is considerable evidence of widespread organisational change. It is described differently in different countries, but around a quarter of larger firms and workplaces appear to have shifted towards the new structures, with manufacturing in the lead. Improved communications is the primary characteristic of change, and concepts of quality management are widely used. However, some attributes of the new forms, such as pay for skills and competencies and autonomous work teams, may be less prevalent than anecdotal evidence has suggested in the past.

At this stage, no reliable cross-country information is available to allow simple statements about which countries are leading or lagging. However, many of the structures and characteristics associated with the new organisation are typified by the organisational features of large Japanese manufacturing firms and workplaces, and globally competing industries such as automobiles in manufacturing and banking and finance in the service sector are associated with various forms of innovative workplace organisation in all countries.

Extent of organisational change by business sector and business size

Despite fairly extensive adoption of many of the features of the new organisation, the picture varies according to firm size (large firms with more resources and facing more competition are more likely to adopt) and sector (sectors more exposed to competition are more likely to adopt). Furthermore, many industries and activities may have little scope to adopt many of the detailed features of the new organisation, even though they seek to improve quality and increase responsiveness.

By business sector: Implementation levels of the new organisation are higher in large firms in manufacturing and services (Bassi, 1995; Australian Bureau of Statistics, 1995; Ministry of Labour, 1994; Fréchou and Greenan, 1995; Greenan, 1995; ISI, 1995; NUTEK, 1996). Manufacturing firms are more likely to have adopted work reorganisation practices, either individually or in groups, as part of an integrated strategy (see, for example, for the United States, Bassi, 1995; Australian Bureau of Statistics, 1995; for Japan, Ministry of Labour, 1994). Certain surveys, however, have shown approximately equal uptake in manufacturing and services (for the United States, Osterman, 1994; for Sweden, NUTEK, 1996). At least in some countries and sectors, the new practices and structures appear to be diffusing slowly. For Canada, Betcherman *et al.* (1994) showed that only a little over a third of firms in four sectors had a formal job design or employee participation programme, and most importantly, that there had been very little change in the five years up to 1991. In 1993 traditional organisational models were still very widespread, although participation-based models (based on job quality, and job design) were common in

the electrical and electronic industries, and compensation-based models (based on incentives, variable pay, high wages and benefits) in business services and large establishments.

In manufacturing, capital goods assembly and automobile manufacture are more likely to adopt the flexible enterprise model in association with advanced technology (Fréchou and Greenan, 1995; Greenan, 1995; ISI, 1995). In Japan, the financial and insurance sector is very actively engaged in planning to unify and simplify structures, and form project and venture teams; finance and communications firms are commonly taking measures to standardize operations, strategically position flexible workers, and make use of information networking (Ministry of Labour, 1993, Tables 42, 59). Similar patterns are apparent in Canada and Sweden (Baldwin *et al.*, 1995; NUTEK, 1996), but in Australia organisational innovation was reported to be relatively low in finance and insurance in a major economy-wide survey of innovation, including organisational innovation (Australian Bureau of Statistics, 1995).

Overall, the new organisation is more common in manufacturing, particularly in association with AMT adoption in motor vehicles and assembly industries, and in some areas of services, usually financial services, where work teams and new communications structures are common.

By business size: Despite fairly extensive adoption of many of the features of the new organisation, the picture varies according to firm size (large firms with more resources and facing more competition are more likely to adopt). Shifting towards the new work organisation is much more common in large firms and is associated, to a certain extent, with downsizing strategies (Conti and Warner, 1994, similar results are available from other surveys).

Why adopt the new organisation?

Reasons advanced for adopting new organisational forms usually centre on raising competitiveness by improving quality and expanding flexibility, rather than on acting directly on productivity and costs. They recall those advanced during the first round of diffusion of microelectronics and advanced manufacturing technologies in the 1980s (OECD, 1991a, 1995).

Features associated with the adoption of flexible work practices and participation-based organisation include sale of products in international markets, use of technology requiring high levels of skill, positive managerial attitudes to employees, and strategies emphasizing customer service, quality, and variety (see Osterman, 1994, for the United States; Betcherman *et al.*, 1994, for Canada; Fréchou and Greenan, 1995, for France; NUTEK, 1996, for Sweden; Nyholm, 1995, for Denmark). Japanese firms have most commonly sought to respond to changes in demand and labour conditions through strategic use of flexible workers, somewhat more frequently than they intended before investing in automation (For Japan, Ministry of Labour, 1993, Table 66). Reasons given for adopting new organisational forms varied: for manufacturing in France, quality and flexibility were more commonly cited as reasons for adopting than reducing employment and restructuring (Fréchou and Greenan, 1995), whereas in Germany, stock and cost reductions were common (ISI, 1995), and in Denmark, saving labour costs were common (Nyholm, 1995).

Scope for reorganising

About a quarter of larger firms and workplaces appear to have shifted towards the new forms of organisation, but there may be little scope for further adoption of flexible production due to narrow

specialisation or because some work practices are already widely employed. German capital-equipment firms, for example, still have considerable scope for further adoption in key areas of work organisation and human resource management and very extensive possibilities for expanding direct quality assurance. On the other hand, they have fewer possibilities in the area of production, except to increase contracting out. In the narrower area of product development, new approaches are relatively widespread and there is less scope for further diffusion of new organisational structures to improve the flow of product development (ISI, 1995).

Barriers to adoption

Many barriers to adoption of the new organisation remain, despite clear competitive reasons for adoption. These barriers include ones that are:

- external (lack of demand, or a generally unfavourable economic outlook that hinders adoption);
- economic (high cost of adopting new organisations, opportunity costs during reorganisation, lack of finance);
- managerial (management sees no need, has no strategy, or does not have the necessary skills to adopt);
- information-related (lack of awareness of what works and what does not);
- human resource-related (lack of management skills and inability to move towards multi-skilled work systems).

Obstacles to the adoption of new forms of production and organisation are largely seen as internal to the firm, and management conservatism and lack of strategic orientation are significant causes for non-adoption (ISI, 1995). In Canada, plants that are adopting new technologies find that impediments associated with the need for new organisational structures are just as important as deficiencies in worker skills (Baldwin and Sabourin, 1996). In general, lack of management know-how and of human resources hamper investment in new organisational practices, while high costs and lack of capital hamper investment in high technologies (for the United States, Manufacturing Institute, 1994; for Japan, Ministry of Labour, 1993). Formation of new structures, such as autonomous self-managed work teams (as opposed to low-level co-operation in work groups), may be difficult and infrequent for reasons of information, management, and human resources (Kleinschmidt and Pekruhl, 1994).

Overall, although there are major strategic and competitive reasons for implementing new work practices and organisational structures, their extent and effectiveness will depend on the scope for widespread adoption and on firm-level barriers, particularly managerial barriers, to adoption.

Effects on tasks and work organisation

Changes are made in tasks and work organisation in order to increase economic and business effectiveness. Enterprise structures have, however, a wide range of characteristics, sector-specific patterns, and possibly national and regional differences.

US establishments have adopted a wide variety of work practices, and quality management and work teams are relatively likely to be used. Work practice adopters are more likely than the average to be involved in training (Table 2). Other work suggests that in non-manufacturing establishments, self-managed teams are most common, while job rotation is most common in manufacturing. There does not yet seem to be any specific clustering of these work practices to create a single, generic, high-performance work organisation (Osterman, 1994).

Table 2. **Adoption of workplace practices in the United States**¹
Percentage of total establishments adopting

	Total	Just-in-time	Work teams	Total quality management	Quality circles	Peer review	Pay for knowledge	Involvement in technology purchase	Job rotation
Share of which share with formal training	100	8.0	9.7	14.6	3.3	7.6	6.8	10.9	8.6
	70.9	73.7	83.6	86.6	89.5	89.0	84.8	84.5	84.6

1. This information covers all US establishments, including the smallest, which have undertaken little or no reorganisation. Values are lower than they would be if the smallest establishments were excluded.

Source: Adapted from Frazis *et al.* (1995).

In manufacturing, work has become more collective following adoption of organisational change; different kinds of workers (notably operators and technicians) combine to work on the same task and autonomous work teams are used as hierarchical links weaken. This shift to more horizontal structures of communication and organisation is reflected in intra-firm reorganisation along the production chain, and external inter-firm links (outsourcing). Reorganised firms develop better external links with suppliers and clients in order to improve quality and reduce stocks and delays. In French manufacturing, about a quarter of enterprises have moved towards the flexible enterprise model, with increased operator and direct worker responsibility, creation of work groups and independent work teams, delayering, decentralisation and reduced hierarchy, and higher skill requirements and multi-skilling. These enterprises are more likely to be using AMT and computer-assisted equipment (Greenan, 1995).

The diffusion of aspects of the new organisation in German assembly industries (metal-working, machinery and equipment) differs widely. The lean production system is relatively widely diffused, with almost half of firms adopting zero buffer stock principles. Special and interdisciplinary knowledge and skills are most widely diffused in the area of work organisation, followed by formation of autonomous work teams; a quarter of firms have adopted direct quality control of products, and about a sixth have adopted new forms of product development (Table 3). Changes in work organisation are the most common set of changes associated with the introduction of AMT in Danish manufacturing; they aim at introducing more horizontal management structures and increasing responsibility and decision making among employees. Specific but less common innovations are the use of autonomous work groups and implementation of just-in-time delivery (Nyholm, 1995).

In Sweden, on the other hand, work teams appear to be relatively widely used and many tasks are devolved to them, notably daily planning and quality control, but introduction and training of new employees, maintenance, and customer relations are also extensively devolved to work teams. Employee responsibility, multi-tasking, and information circulation are all higher with the new organisation, and the number of levels of management decreases (NUTEK, 1996). Spain has seen a shift towards greater employee involvement, reorganisation of work to reduce hierarchies and change work schedules, profit and benefit sharing, changes in job content, and training. The most important trends are increased

responsibilities (although not autonomy), flattened hierarchies, shorter decision chains, and shifts in channels of communications to increase interdependence among and within teams (Saez, 1991). Despite the frequency with which it is cited, the move to high-level autonomous self-managed work teams may be limited to a few production activities of certain kinds, and to management and R&D activities in industries such as business services (Kleinschmidt and Pekruhl, 1994).

Table 3. **Use of new production and organisational methods in investment goods production in Germany**¹
Percentage of firms

Production	%	Work organisation	%	Quality	%	Product development	%
Product-oriented plant layout	35	Task/activity integration	8	Quality circle	15	Standardisation and variety	15
Contracting ¹	18	Work groups	14	Process quality control	25	Development teams	16
Zero stock	49	Knowledge/skills	30			Co-operation with suppliers	18
Just-in-time	30	Participation	6				

1. Share of own production below 40 per cent.

Source: ISI (1995).

Overall, cross-sectoral surveys confirm the diffusion of workplace reorganisation and the development of high-performance workplaces, which involve horizontal, responsible, collaborative approaches to work, based on skills and broad specialisations. There may be differences across countries in organisation style and extent of adoption and, in some countries, it may be difficult to implement particular features of the new organisation, but little reliable cross-country information exists.

4. Impacts and effects of organisational change

The new organisation can be expected to affect firm-level and aggregate economic variables in a number of ways:

- output, employment, and productivity through more cost-effective production of goods and services;
- a downward shift in the average size of enterprises and operating units (“downsizing”);
- a shift towards purchasing inputs from service sectors, which are growing rapidly (“outsourcing”);
- rise in qualifications requirements and greater importance of training;
- occupational shift towards “skilled” and “white-collar” groups;
- increased wage dispersion within occupational categories and industries as pay is linked to personal and business performance and variation in hours (owing to part-time work, for example) increases;
- greater use of non-standard employment contracts (part-time and temporary) for peripheral workers.

This section examines only the first of these issues. The others are treated in more detail in the report on *Technology, Productivity and Job Creation* (OECD, 1996a, Chapter 6), but many of these features can be substantiated from cross-sectoral establishment and firm-level surveys. This section addresses the question whether the new organisation appears more successful, in terms of output, employment, and productivity, than more traditional forms of organisational structure.

Impacts and effects on output, employment, and productivity

A major incentive for exploring technological and organisational change and associated labour practices and enterprise training is to explain economic performance. As one observer has put it, "At the heart of differences in performance across plants are factors that we do not measure very well, like the managerial and work practices which are part of the operations. (...) The amount of variation in productivity, wages, and job destruction explained by the standard observables -- size, age, capital intensity, industry, high-techness, etc. -- is very small." (McGuckin, 1994) This section reviews analytical work linking organisational change and human resource development with output and productivity.

A study of US experience concluded that the new work organisation and specific workplace practices such as training, alternative pay systems, and employee involvement are often correlated with higher productivity. These and other practices are associated with greater productivity when implemented together, although the nature of the relationship between high-performance work practices and productivity has been unclear owing to lack of reliable data (Kling, 1995; also Betcherman *et al.*, 1994, for Canada). A major review of the impacts of technological and organisational change in Canada (based very largely on survey evidence) concluded that the association between technology and firm performance is positive, but that effects on employment growth tend to be weaker and that bundles of organisational innovations can result in better performance. Technologically and organisationally innovative firms place a premium on highly skilled workers and tend to pay them more (Clements, 1996).

Opinion-based surveys of the impact of organisational innovations are usually positive. Often cited are improved productivity, worker morale, and customer satisfaction; improved delivery time, technical achievements, and profits are also noted. Positive effects increase with the number of changes reported and the existence of workplace education programmes (Bassi, 1995; Manufacturing Institute, 1994). Betcherman *et al.* (1994) reported better trends in labour performance and unit costs in Canadian establishments adopting participation-based models. Despite improved firm performance, the employment impacts may be less positive. A major survey on the introduction of technological and organisational change in a UK region showed that employment effects were relatively minor (few establishments reported either job losses or job gains), but net employment effects associated with organisational change were negative, and the pattern of job of employment effects associated with organisational change was distinctly different from those for technological change (Campbell, 1993).

Econometric analyses of organisational change based on cross-sectoral survey data provide evidence of indirect positive impacts on productivity. One major US study shows that links are strong between new work practices and incidence and depth of training, and that investments in human capital have positive effects on productivity. But new work practices did not appear to have a direct effect on productivity. The explanation lies in the adjustment and lag effects of introducing these practices. Furthermore, how work practices are introduced and implemented partly determines their impacts, and clusters of work practices probably have more impact than individual ones (Lynch and Black, 1995). Detailed analytical work has found, for 35 US steel finishing lines, that high-performance work practices (problem-solving teams, profit-sharing plans, pay for knowledge, formal training) have a significant

positive effect on productivity, particularly if they are used together (Ichniowski *et al.*, 1994, the approach is somewhere between surveys and case studies).

Training, certain characteristics of the new reorganised workplace, and business performance have been positively related in Chinese Taipei, Colombia, Indonesia, Malaysia and Mexico (Tan and Batra, 1995). Investments in R&D and knowledge are associated with enterprise training, the probability of training is higher when there is a greater share of semi- or fully automatic equipment, and employers that emphasize quality control are more likely to train. Firm investments in training, especially in-house training and training of skilled workers, have large productivity payoffs. Firm-level efficiency correlates with education, training of skilled labour, and exporting; and efficiency increases with firm size. In this set of developing countries, highly efficient firms invest in certain kinds of technology, use an educated and well-trained work force, adopt organisational practices emphasizing greater automation and quality control, and human resource practices that encourage attachment to jobs and skill acquisition. Similarly in Canada, innovation, technology, and human resource strategies at firm level have been shown to be complementary (Baldwin and Johnson, 1995).

A comprehensive survey of best manufacturing practice in Australia and New Zealand showed that firms that were leaders in the adoption of best practice had higher sales growth, greater export sales growth, were more export-oriented, had better cash flow and somewhat better employment performance. "Best practice" was defined in terms of scalar values for customer focus, product and process quality, benchmarking practices, technology, human resources, and management. Leading firms (the top fifth in both practices and outcomes) were distinguished most from lagging firms by their human resource management and development practices (teams, communications, multi-skilling, training, health and safety), management strategies (employee involvement, continuous improvement), and benchmarking (search for best practice) (Australian Manufacturing Council, 1994). In Sweden, estimates suggest that the flexible organisation has around 20 per cent higher productivity than firms with traditional structures, that it sets a premium on more highly educated personnel, and that its employee turnover is lower. Furthermore, although Swedish manufacturing suffered drastic declines in employment in the early 1990s, firms with the new organisation had a somewhat better employment performance than traditionally organised firms -- their total employment declined less, and numbers of highly trained and skilled employees expanded more than for traditional firms (NUTEK, 1996).

The positive impact of organisational change on productivity and employment in manufacturing firms is clearly demonstrated in a Danish study based on a survey of manufacturing. Firms that combine changes in management structures and/or work organisation with the introduction of AMT have the highest productivity and employment growth. Firms that simply introduced AMT did not have significantly better labour productivity than non-adopters, although their performance improved over time; after information and communication technology (ICT) introduction, firms often showed declines in productivity before they reaped productivity benefits. Growth in productivity and employment were most strongly associated with changes in management structure (Nyholm, 1995). French analysis suggests that, overall, organisational change in manufacturing is associated with quality strategies. It also suggests that only with greater use of technology is there a positive impact on employment (Greenan, 1995). Although they are not dealt with to any extent here, productivity will also be affected by changes in workplace health and safety associated with new technology and new organisation. There is evidence that physical injuries have declined as new technology and better organisation diffuse through manufacturing, but various new effects on health such as stress, cardiovascular disease may be associated with new technologies and the new ways of organising work (see Sánchez Muñoz *et al.*, 1996).

In sum, there are positive benefits in terms of productivity and employment associated with the new organisation of work. However there appear to be few simple, direct links between organisation and

measures of productivity and employment. The line of causality relies on the combined use of a bundle of work practices and organisational structures. Work practices such as employee involvement, pay for competencies, and other ways of increasing worker effort are usually combined with training and multi-skilling and have the greatest impact when they are used in a workplace system. Employee education and training have positive effects on productivity and enterprise performance. Thus, it is the bundle of strategies associated with workplace reorganisation, including enterprise training and a highly skilled and motivated work force, which improves performance and suggests that these organisational changes are sustainable and durable.

5. Implications for the development of new indicators

This review of available cross-sectoral multi-establishment or multi-firm surveys which focus on organisational change (along with technological change in some cases) and surveys which have been carried out for other purposes, but which show the extent of organisational change or some features of it shows:

- an increasing number of surveys are becoming available;
- they are providing a better picture of how firms and workplaces are restructuring;
- they can be particularly useful in identifying the characteristics of the “new” organisation;
- the new organisation can be characterised as having widely distributed responsibility (“high trust” organisation), and a relatively large share of employees are highly educated staff (with high level educational attainments) and there are high levels of skill development (with high levels of staff training effort);
- these surveys are developing a widely recognised vocabulary or lexicon, which can be recognised over time, and across countries, and that is not reliant on the use of jargon which is rapidly obsolete and imprecise (“re-engineering”, “right-sizing” etc.);
- analysis based on these surveys is becoming increasingly robust;
- this analysis shows that a number of workplace practices are associated with the new organisation of firms, but these vary across sectors (i.e. work teams or quality circles are more appropriate in some industries and activities than others), and probably vary across countries.

There are several methodological and substantive objectives that should guide the future development of indicators:

- An improved lexicon of terms describing workplace and enterprise organisation and change is required. At a minimum, this should cover aspects of internal enterprise structure, internal intangible assets and enterprise strategies; external linkages with suppliers, customers, and strategic partners; workplace organisation; occupational functions; and various human resource management practices.

- Work is needed to evaluate the different approaches to measurement of different variables, and to further test the power of alternative definitions in current use to arrive at useful results.
- More rigorous analysis of the key characteristics of workplace organisation should be undertaken to better identify the “new” organisation (“high skill” and “high trust”).
- In the interest of minimising duplication and enhancing the cost-effectiveness of existing surveys, it would be useful to evaluate the potential and limitations of linking narrow-purpose surveys (of technology use, labour costs, training activity, for example) for the purpose of providing more comprehensive analytical databases.
- More comparable surveys across countries would be useful to identify if there are major cross-country differences in the characteristics and extent of diffusion of workplace and enterprise organisation.
- Surveys should include measures of workplace or enterprise performance so that the relations between organisation and performance can be more clearly established. Alternatively, better links need to be made with established databases (e.g. census of production) to enable organisation and performance to be measured and correlated.

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