



Work organisation, technology and working conditions

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This leaflet summarises the main findings of the statistical analysis of technology, work organisation and work outcomes in the Foundation's Third European Survey on Working Conditions 2000. It provides a comparison of these results with other statistical surveys on working conditions carried out at national level by several Member States.

Main findings

- Technology and work organisation should be treated as separate dimensions in the work environment. Both have a different impact on work and health outcomes.
- Jobs can be divided into four different work organisation contexts:
 1. Active work organisation: workers experience high levels of demands but at the same time enjoy enough opportunities to control these demands.
 2. Passive work organisation: workers experience no job demands and have no control over the changing features of the work environment.
 3. High-strain work organisation: workers experience high demands but have no way of controlling what happens. They have to passively adapt to ever-changing and possibly conflicting demands.
 4. Low-strain work organisation: workers experience low demands and have enough control to deal with problems.
- Work intensity continues to increase in all Member States. In general, workers work faster and to tighter deadlines. Autonomy at work is also on the increase, but this increase is not sufficient to compensate for the increased intensity of work. This means that more workers are confronted with high-strain work situations.
- Health and work outcomes are different for the four work organisation situations: high-strain situations are linked to self-reported stress, musculoskeletal problems and low job satisfaction. Low-strain situations are linked to fewer health problems in general. Active situations are linked to greater opportunities for learning. The rise in high-strain work situations signifies that more workers will experience worsening health and work outcomes.
- Use of computers is rising continuously. The number of workers only using machine technologies or no technology at all is diminishing.
- The use of different technologies reveals different work outcomes:
 - The use of new technologies is associated with fewer physical health problems, such as allergies/asthma, along with more skill demands and higher satisfaction with working conditions. Workers using new technologies are also more likely to have more training, sport, cultural or leisure activities or other social activities outside their jobs.
 - The use of machine technology is correlated with more musculoskeletal health problems and allergies/asthma, and also with fewer opportunities for developing skills requirements. Workers using machine technology tend also to be less satisfied with working conditions.

The European industrial society is gradual changing into an information society. Not only will the use of technology be different in this information society, but also the use of work organisation will change. Such changes have an impact on the health and motivation of workers, as well as on the skills required of them. The Third European Survey on Working Conditions provides us with an opportunity to analyse these relationships. The comparison with previous Foundation surveys delivers some insights into the development of our industrial society.

Concepts of technology and work organisation

The research into the two dimensions of technology and work organisation is not as straightforward as it appears here. Both dimensions have had to be interpreted from several questions in the survey. The very few questions about technology were used to separate work situations with 'new technology' from those with 'old technology'. New technology can be seen as those work situations in which computer use is required. Old technology is therefore all those working situations in which technology is present (mechanisation, etc.) but where computer use is not required. Using such definitions, there remains a third situation, which is a technology-free work situation.

There are different research approaches to work organisation. The 'socio-economic' approach focuses on aspects of work organisation and functioning of enterprises. In this report, work organisation is approached from a psychosocial perspective. The starting point of the analysis is the psychosocial consequences of work organisation for the health and well-being of workers (Rantanen et al, 2001). This approach is more suited to surveys such as the Foundation surveys. The work organisation can be described using two major dimensions: time constraints (job demands) and job autonomy (job control). Using these two dimensions, four types of work organisation can be distinguished: active work organisation, passive work organisation, high-strain work organisation, low-strain work organisation.

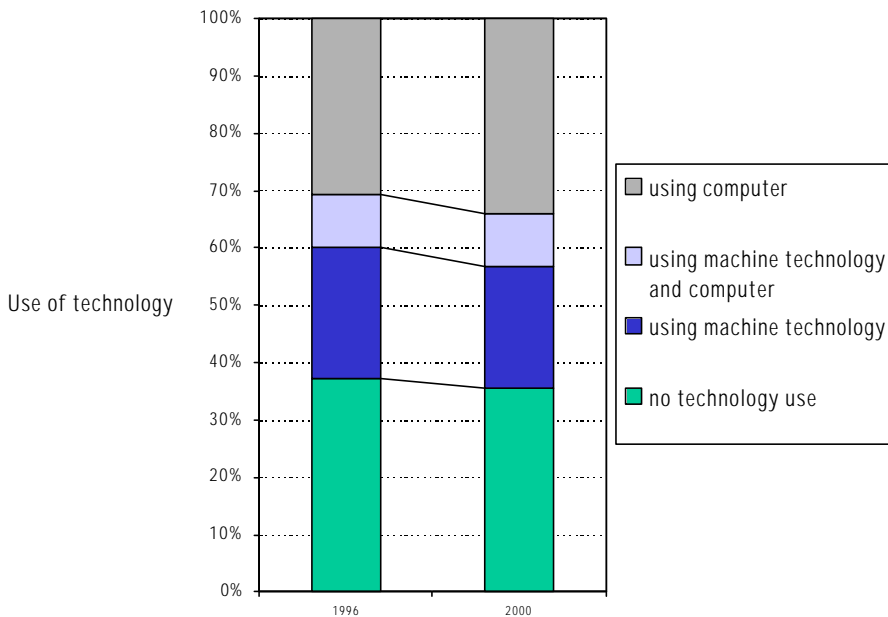
Use of computer and machine technology

Our analysis of technology in the working conditions survey has shown that we can accept that the technology variable represents a valid concept. We can see that just slightly more than one third of workers report no use of technology in their work situation. Another third of workers use computers, whilst the rest use only machine technologies or machine technologies combined with computers.

The Netherlands has the the highest use of computer technology by employed workers, with some 70 % of workers using some kind of technology . Portugal is at the other end of the spectrum with nearly half of the workers not using any kind of technology. More workers in the northern European countries than in southern Europe use some kind of technology. Service workers and shop and market sales workers have the lowest degree of use of any kind of technology. Such jobs involve more customer contact or simple tasks without the use of technology. However, these workers might be using teller machines and/or telephones, and it is significant that the survey does not make this distinction. Most other white-collar workers use computers. Most blue-collar workers do not use computers, they mainly use machine-related technology. However, the EF2000 survey does not allow for detecting the degree to which these machines have some kind of computer controls.

The different European surveys show that the use of computers has risen over time. This is clear from Figure 1.

Figure 1: Changes in the use of technology from the 1996-survey to the 2000-survey.



The technological distinction constructed from the EF2000 survey is still quite rudimentary, however. If some more insight is to be gained into technological developments, it will be necessary to broaden the concept and use more questions about technology. For example, it will be necessary to insert some more questions in the survey about technologies used by service workers (e.g. tellers, telecommunications equipment) or about (computer) numerically controlled machinery. The box below shows the questions that were used in the Swedish survey on working conditions.

Technology in the Swedish survey on working conditions

Work with any of the following computer equipment:

- Cash register/computerised cash register
- Personal computer, computer terminal or similar
- Programmable mechanical tools
- Computer-controlled production process
- Computerised control or measurement
- Only portable PC
- Both stationary and portable PC

Use computer equipment (one or more of above):

- Working with computer equipment (at least 1/2 of working time)
- Working at a display monitor

- Display monitor (at least 1/2 of working time)
- Type of computer equipment
- Mouse at computer
- Trackball, touch pad, joystick, etc., at computer
- Keyboard at computer
- Barcode reader at computer
- Mostly using mouse

Using computer equipment mainly to:

- Key in data, word process the work of others
- Search for information
- Process data, analyse data, programming, etc.
- Monitor control information

Safety and health outcomes

Figures 2, 3 and 4 provide a graphical analysis of the relationship between work organisation situations and health and safety outcomes over time. The results from the EF1991, EF1996 and EF2000 surveys are given. The outcome variables have changed in wording and content over time (see Dhondt, 1998). The health and safety variable has a more reduced content than in the past. This could explain the lower percentage of workers with health and safety risks reported in 2000. The 'low-strain' situation shows the lowest percentages of complaints. The 'high-strain' situation always shows the highest percentages of complaints.

Figure 2: *Work organisation and perceived health at risk in the EF 1991 survey*

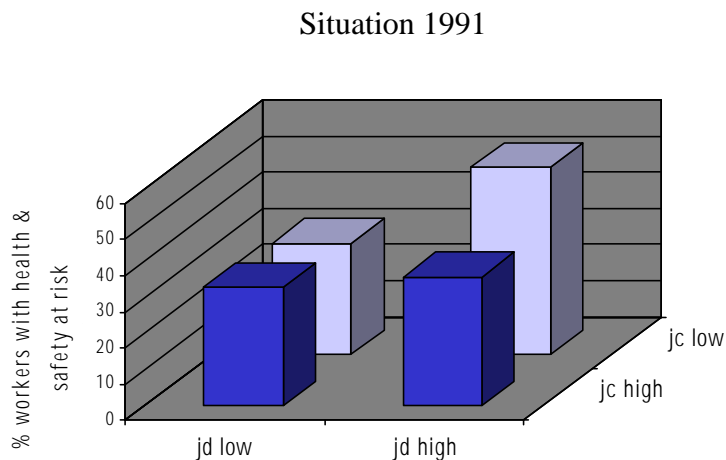


Figure 3: Work organisation and perceived health at risk in the EF 1996 survey

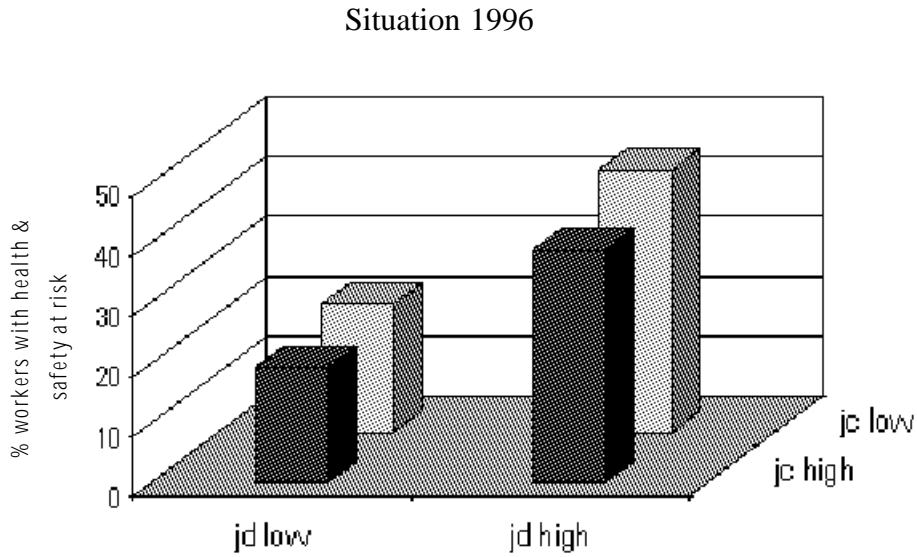
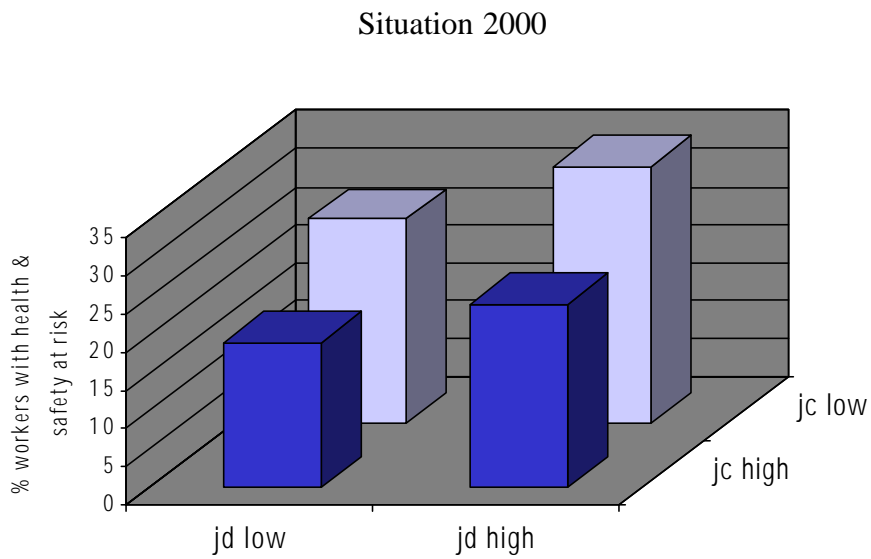


Figure 4: Work organisation and perceived health at risk in the EF 2000 survey



The main conclusions of the statistical analysis of the relationship between technology, work organisation and work outcomes is shown in Table 1.

Table 1: *Summary of a statistical analysis of the relationship between technology, work organisation and work outcomes*

	No use of technology	Use of machine technology	Use of machine technology and computers	Use of computers	Passive work situation	Low strain work situation	High strain work situation	Active strain work situation	Control technology
Work-related health outcomes concerning:									
muscular/limb/back pains (high=many)		+		-		-	+		
Headaches/stress/fear etc. (high=many)						-	+		
allergies/asthma (high=many)		+		-					
Skills and satisfaction									
Skills (high = less)	+	+	-	-	+			-	
Satisfaction with working conditions? (high = less)		+		-		-	+		
Social factors									
Training, sport, cultural, leisure activities (0=never; 5=average of 1 hour every day)		-		+					
Societal activity: voluntary/charitable and political/trade union activity				+					
Cooking and housework activities (0= never; 5=average of 1 hour every day)		-							

+ = positive association; - = negative association.

Comparison between Foundation surveys and national surveys

Table 2 summarises the main findings from the comparison between the work organisation and technology questions in the Foundation surveys and several national surveys. In Figures 5 to 9, the trends in the different countries are shown.

Table 2: Comparison of the use of technology and work organisation in the national surveys

	High speed		Tight deadlines		Autonomy		Technology	
	Levels	Trend	Levels	Trend	Levels	Trend	Levels	Trend
Finland	(-)	-	(-)	+/-				
Netherlands	+/-	+	+	+	+	+		
Germany	+	-	+/-	-	+/-	+	+/-	+
Sweden	-	-	+/-	+	-	+	+/-	+
France	+	+	+	+	+	+/-		

(-): uncertain because of differences in definition; + = convergence of results; +/- = partly convergence; - = no convergence

The difficulty with this comparison lies in the differences in the questions, answering categories and timing of the surveys. Such small differences can cause deviations between surveys. Limited developments in certain questions can be influenced by such differences. The validity of the EF surveys cannot be judged on comparisons with each of the separate national surveys, but rather on a higher level of several questionnaires together. This limits the impact of small deviations that have been caused by chance. From Table 2, it would seem that there is more disparity in the 'high speed' question and the national figures on time constraints. The figures are more in line for tight deadlines, autonomy and technology. For technology, the comparison is still quite limited because we can only compare two countries with the EF data. Trend information seems to correlate for tight deadlines, autonomy and technology. This does say that the EF surveys are measuring the developments in these separate countries. In several cases where there is a disparity in results between the national data and the EF data, these differences arise only when there are slight changes in the direction of the trends. For such changes, it is necessary to have a longer time series to be sure that the EF survey is not getting it right.

Overall, we can see that time constraints have risen quite considerably in the last decade and that in most of the countries job autonomy has not kept up with this development. This means that more and more workers are being confronted with high-strain work situations, which are detrimental to health. On the basis of our analysis of technological factors, we can see that a rise in the use of computers is not a cause of this. A second result is that this trend in rising time constraints seems to be 'levelling off'. The rise is not as high as it was at the beginning of the 1990s.

Conclusion

This study is about technology and work organisation in the European Union, using the results of the European Foundation for the Improvement of Working and Living Conditions' Third European Survey into Working Conditions 2000. In a previous study, we showed how the distinction of four different types of work situations shows different health and other work outcomes (Dhondt, 1998). This result is repeated in the new survey. In this new study, we have added technology as a new dimension to work organisation. A focus on technology is important because of the technological changes that are taking place in our industrial society. It is a common belief among researchers and policy makers that Europe should direct more attention to the study of work organisation and technology. But the means to investigate the developments in work organisation and technology have remained quite limited. The new Foundation survey does contain several elements that can give good insights into these subjects. Our main conclusion is that the Foundation survey gives a valid representation of developments in work organisation and technology within the European working environment. Attention in future surveys should be directed at adding more questions about types of

technology, use of technology and control of workers over technology. In this way, valuable insight can be gained into the shift of the European economy to the information society.

Figure 5: Finland: comparison of time pressure questions in the Finnish surveys and the EF-survey

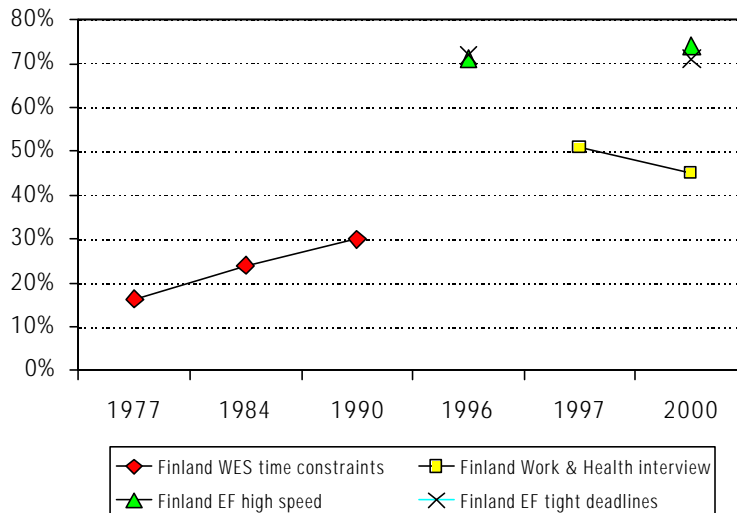


Figure 6: Germany: comparison of time pressure questions in the BIBB/IAB-survey and the EF-survey. (Germany: immer + häufig; EF: 25% of time and more)

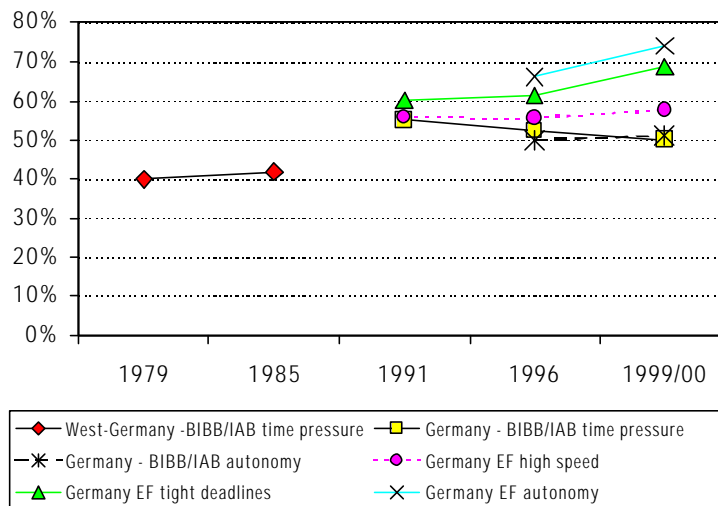


Figure 7: The Netherlands: comparison of time pressure and autonomy questions in the DLO-survey and the EF-survey

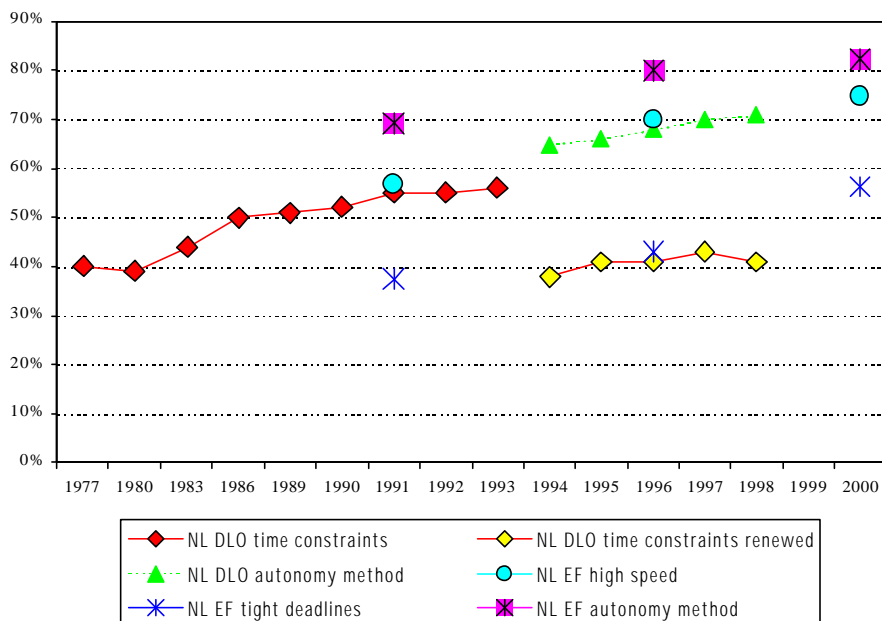


Figure 8: Sweden: comparison of time pressure and autonomy questions in the SC-survey and the EF-survey

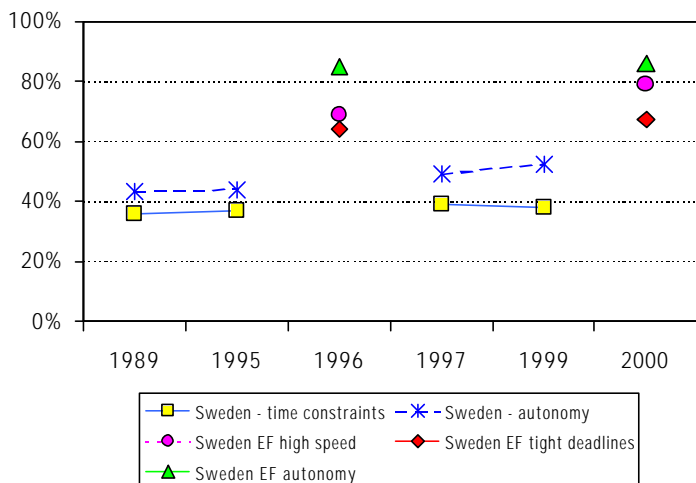
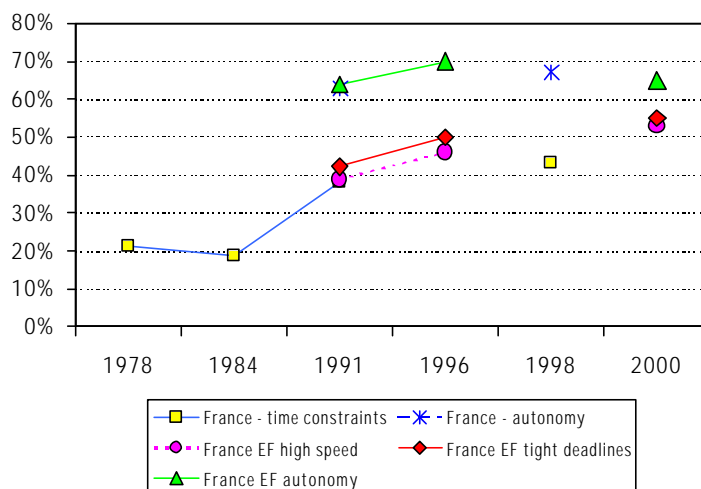


Figure 9: France: comparison of time pressure and autonomy questions in the Totto-survey and the EF-survey



National surveys		
Country	Questionnaire	Data analysis and reporting
France	Questionnaire Complémentaire sur les Conditions du Travail Questionnaire Complémentaire sur les Techniques et l'Organisation du Travail	DARES (Ministère du travail)
Germany	- BIBB/IAB-Erhebung	BIBB/ IAB
Netherlands	(Doorlopend) Leefsituatie Onderzoek ((Continuous) Life Situation Research)	Dutch Bureau of Statistics (CBS)
Sweden	Arbetsmiljön (Working Conditions)	Statistics Sweden
Finland	Arbetskivets kvalitet/ Työelämän laatu (Quality of Working Life Survey) Work & Health Interview	Finnish Statistical Office Finnish Institute of Occupational Health

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