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WORK AND TECHNOLOGY  
in  
EAST-WEST COMPARISON  
THE CONTRIBUTION OF THE VIENNA CENTRE

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Work and Technology in East-West Comparison  
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1. Introduction

*conclusion*

The Netherlands seem to be one of the very few industrialised countries at the moment where the importance of the impact of New Technologies did not yet lead to an increase in social research. Being a relative outsider it is not to me to explain this situation. Nor shall I try to argue in favour of social research into the development and introduction of New Technologies. I would rather like to make a jump and to present some arguments in favour of international comparative research in this area. In doing so I can also inform you about the role of the European Coordination Centre (Vienna Centre) and about some experiences we made in coordinating international comparative research projects on Technology and Work.

2. Why international comparative research ?

One of the main characteristics of traditional social research on the impact of technology on society is its technological deterministic approach.

Technological development is seen as something given, unavoidable, with its own intrinsic logic of development. Technology is also supposed to have necessary consequences especially for employment both quantitatively as well as qualitatively. Although, as is known, there is serious disagreement about the nature of these consequences. Together these two assumptions formed the basis of one of the convergence theories, which claimed that all industrial societies in the process of industrialisation will more and more grow alike.

When one looks at the present public debate on New Technologies, this set of ideas still appears to be present. At the same time, however, we can also witness in recent social science publications a strong trend which is *tendency* highly critical towards the traditional approach. One might even speak of an "anti-technological-deterministic climate" in social science. In my opinion, especially comparative and certainly also international comparative research has contributed much to this change. There are many attempts now to conceptualise and investigate technology as a societal phenomenon? One also has to admit, however, that this has not yet lead to a maturation of a new paradigm. But again, international comparative research could play a very important role here.

What is the background of this? Without pretending to give a thorough analysis of this change, some arguments which emerge from the scientific discussion should be mentioned.

First of all the intrinsic logic of development did not prove to exist in the radical form as it was stated during the period of the automation discussion. The practical use and application in work organisations of new technology is now known to be the result of a complicated interplay of political, economic, social and also "by chance" factors. The configuration of these factors differs by enterprise, industry, region, country and socio-economic system as is - by consequence - the diffusion of a technological innovation. Technological development is widely accepted now to be a social process.

Secondly, much of the research conducted in the past was dealing with implications and consequences of technology and technological change. This research has been guided by the assumption that a certain technical equipment always was connected with one specific form of work organisation. On the basis of such a contingency assumption (the one best way) it was thought to be sufficient to choose a number of typical cases of technological development and to generalise the findings of these cases into tendencies of human labour in the process of technological development.

However, exactly the growing evidence of diversified and often even radical opposite implications which the same kind of technology appeared to have in different cases has led to the conclusion that this strict and direct relationship between technology and work does not exist. The organisation of work is seen to be the main reason for the flexibilities found (see e.g. Dietrich & Morley 1981). A given technology apparently allows considerable variation in the organisation of work. And the attention has moved away now to the question which factors, given a certain technology, influence the shape of work organisations. In the course of this development technological determinism thus lost the basis for one of its assumptions. The relative autonomy of work organisation with respect to technology seems now generally accepted, both among Western as well as among East-European researchers (Deppe & Hoss 1983, Adler 1982). As is consequently the principle "social makeability" of work organisation. Connected with this we now also find a shift of interest from consequences of technology towards conditions of introduction of technology (Berting 1980). At the same time, however, new divergencies of opinion arise, e.g. with respect to the possibilities offered by new technology for an autonomous role of work organisation. Some authors argue for a growing elasticity between technology and work (Lutz 1983), others on the contrary interpret the new technology as being a specific organisation technology in its own right and as such they see less flexibility for variation in work organisation (Benz-Overhage et al. 1981).

In summing up I would like to stress the following:

- the loss of scientific credibility of the traditional technological deterministic approach has been the result of empirical studies, that partly were conducted within the traditions of this approach themselves;
- the present state of anti-technological determinism has led to a shift in the research interest in favour of social factors influencing work organisations and conditions of technological change. The fact that both technology as well as work organisation are considered as social phenomena gives again a task for social science to be involved.

The shift in research interest goes parallel with a change in concepts and research methodology but probably also involves a change in what realistically can be expected from social science for society in this field. This brings us back to the question raised at the beginning of this section: why international comparative research?

One of the strong points of much of the sociological research on technology and work is that it tended to focus its efforts on the level where technological change actually takes place, that is to say at the enterprise level. Detailed case studies usually formed the basis for the debate. But much of it was, as was argued, consequence-oriented and was taking the technology as something given. The few research projects dealing with the conditions for introduction usually tended to restrict themselves to the enterprise level as well. It was the decision-making process and the participation of workers or their organisations in it that was the object of these studies (Björn-Andersen et al. 1979).

Many studies from this first anti-technological deterministic period in fact ended up with the suggestion that workers could and should be involved in the decision-making process on introducing new technology (preferably already in the designing stage) in order to prevent as much as possible negative consequences for all parties involved. Of course, one can agree that this is a very logical policy implication if one observes that the application of a certain technology leaves room in principle for alternative ways of work division and organisation and that it is a matter of "strategic choice" which ones will be the result in the end.

However, besides the normative touch (which every policy implication contains, of course) there is a more serious objection one can make to this recent approach which has become known as the socio-technical approach. If there is no technological determinism, does that imply that there is an undeterminable number of alternative options from which one can "choose" voluntarily, the result of which only depends on the participants and procedures of the choice process? That cannot be the case of course. And without simply exchanging technological determinism for social determinism, one would ask for a more serious investigation of the potential social "constraints" and "degrees of freedom" in a broader way than is usually done.

In social science the use of the concept "social" cannot be limited to inter-personal or inter-group relations but it also contains the notion of "societal" and refers in this sense to society. This leads us to another level where "conditions" for the introduction of new technology are at stake and have implications for its consequences as well. Actors at the enterprise level are both conditioned and restricted by the possibilities their society offers to them.

Focussing on the decision-making process at the enterprise level, however, still means in the majority of the studies, that the enterprise and its actors are treated as autonomous, completely isolated from the society in which they are located.

What is the relationship between enterprise and society? It is this question which then emerges as the dominant one. More precisely it asks for the analysis of the reciprocal interdependencies between the enterprise on the one hand and societal structures and the public policies related to them on the other.

It is indeed within the perspective of such a "societal approach"<sup>3</sup> that the arguments can be found for international comparative research. In a research of this type enterprise policies and (connected with new technology) changing enterprise structures can be analysed against the background of national specific macro conditions and state policies<sup>4</sup>.

A number of recent international comparative research projects in fact have already proved that industrial organisations using the same kind of production technology but located in different countries

- organise their work in quite different ways
- have diverging manning, qualification and rewarding structures
- employ workers who think in a different way about their positions and behave accordingly differently both individually as well as collectively.

These international comparative studies clearly demonstrate that there is no technological determinism and they suggest a strong influence of societal characteristics in shaping both similarities and differences at the enterprise level. These studies,<sup>5</sup> however, have unfortunately focussed exclusively until now on western countries. Moreover, only the central role of the educational system and of the system of industrial relations has been taken into account so far.

### 3. The Vienna Centre's<sup>+</sup> international comparative projects on technology and work

Although there is a new interest in international comparative research growing out of the research experiences made until now, the evaluation of what has been achieved by international comparative research so far does not really look very favourable. Instead, however, of repeating her what has been said by others in ways that can hardly be improved anyway (Child & Tayeb 1983), I would like to describe the Vienna Centre's experience in this area. This goes back for almost 15 years now and is closely linked to the development of the scientific debate.

The first involvement of the Vienna Centre started with setting up the Automation and Industrial Workers project in the early 1970s as a consequence of the debate at that time on the impact of automation.<sup>6</sup> Fifteen countries, all Europe's major industrial countries and the USA and Japan, took part. The project focussed on workers attitudes, work content and working conditions as a result of automation and stood, in this respect, firmly in the tradition of "consequence research".

Also from a methodological point of view it can be said to be a traditional research, since it used detailed standardised research instruments for attitude surveys and workplace observations to be applied by all national teams. From an organisational point of view the project was rather unique, since it brought

together management, trade unions and researchers to elaborate and carry out the empirical investigations (Rantalaiho 1982).

More interesting, in the present context, however, are two other characteristics of the project which I would like to touch briefly here. First of all it was during the course of the project that in the international discussion the central role of work organisation and its variability with given technologies was realised. The automation project, however, had been designed within the traditional paradigm of technological determinism in which work organisation did not yet have a predominant place. In comparing the results of the various national case studies these very variations (among nations and systems) was eventually found. This necessarily led the project participants to a rejection of technological determinism, but it was impossible to reflect on the role of work organisation and its determinants since no systematic data collection had taken place with this respect (Mittler 1982).

Secondly, although the research instruments did cover national and system specific data the technology consequence paradigm which guided the research design did only allow this information to be used at a descriptive introductory level. Its main function was to give background information for the national reports. The design, and especially the research methodology (survey among workers and observation of individual workplaces both with standardised instruments) prohibited a systematic analysis of interdependencies of enterprise and society (or system). The suggestion which was made by the automation project that the socio-economic system context is of greater importance for the impact of technology than technology itself, is by consequence hardly substantiated by the results of the analysis.

The present Vienna Centre project on Conditions and Consequences of the introduction of new technology at work can be considered as an attempt to take account of exactly these two points<sup>1</sup>. The project started by the end of 1981 and involves 17 research teams from 14 East and West European countries and an Australian group. The aims and structure of the project can be summarised as follows:

1. The project deals with conditions and consequences of the introduction of three specific types of new technology at the enterprise level:
  - computer numerical control
  - process control
  - office automation.
2. The project intends to contribute to a better understanding as to how societal conditions have an impact on consequences of the introduction of new technology at work. At the same time we would like to know better how these new technologies and their consequences in turn influence the

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+ The European Coordination Centre for Research and Documentation in Social Sciences "Vienna Centre" (Grünangergasse 2, 1010 Vienna, Austria) is an autonomous body of the International Social Science Council and an international non-governmental organisation. It was created in 1963 as a result of a UNESCO resolution and it aims to promote scientific cooperation between East and West European countries. Its activities comprise all areas of social sciences and include coordination of cross-national comparative research projects, training of social scientists in comparative research, organisation of topical conferences and of a cooperation and exchange of social information and documentation.

development of society.

3. The project is designed as an international comparative research making use of research reports provided by national research teams, who are responsible each for the collection of national data.
4. Societal conditions will not only be studied at the enterprise level by analysing the decision-making process in introducing new technologies. They will also be investigated at the level of the broader national "context" in which the enterprise and its actors are located. The relationship between these societal levels will be our main interest. On the level of society we focus primarily on
  - the educational system
  - the industrial relations system
  - the technological climate
  - the social policy of the state
  - the structure of the industry.
5. Consequences of the new technologies will be studied in 5 subject areas:
  - changes in the overall organisation of work
  - changes in work content and load
  - changes in qualification structures
  - changes in worker's culture
  - changes in industrial relations at the enterprise level.

It is obviously the first one (changes in the division of work) which is the central research dimension. Indeed, the quality of individual workplaces (content and load), the resulting qualification structure (relationship between available and defined qualifications, the social relationships within the enterprise, social status of different groups both formal and "real"), and the structure and content of interest representation depend to a high degree on the way in which the work has been divided and organised in tasks, jobs and departments, each with its own professional and social responsibilities.

6. Reports from the national research teams will contain two parts:
  - case descriptions and
  - national background information.Teams will have to provide additional background information if at a later stage the comparative analysis asks for that.
7. The case descriptions will give a historical descriptive analysis of the social process of the introduction of new technology at the plant level. Every case will also include at least an analysis of changes in work organisation. Other selected research areas will be covered by at least two participating teams to make an international comparison possible.

The choice of research techniques and instruments will mainly be left to participants according to their possibilities.

As a guide for the description a list of major topics to be included for every research dimension is jointly elaborated.

Subject areas

	National						CNC	Process	Office
	1	2	3	4	5	6			
Australia	x	x	x	x		x			x
Austria	x	x	x	x	x				x
Belgium	x	x		x		x			
CSSR	x	x	x	x			x		
SF	x	x		x	x			x	x
FRG	x	x	x	x					x
West Berlin	x	x	x	x	x			x	
GDR	x	x	x	x		x		x	
H	x	x							
GB	x	x		x		x		x	x
Italy	x	x	x						x
NL	x	x		x		x		x	x
P	x	x	x	x	x				
USSR	x	x		x	x	x		x	
YU	x	x							x

1) Process of introduction, 2) Organisation of work, 3) Quality of work: content/load, 4) Qualification structure, 5) Workers' culture, 6) Industrial relations



The national reports will also include background data thought relevant by researchers for explaining national specificities.

8. These first national reports will then provide the basic empirical material for the second stage of the project: the international comparative analysis. This analysis will be done by participants themselves through an intensive confrontation of their case study results with those reached by other teams. The comparative analysis will thus be a cooperative endeavour, each team participating in it according to its possibilities and concrete interests.

In the scheme I the comparative potential of the project is summarised.

The project is dealing primarily with qualitative consequences of new technologies introduced under different societal conditions, as empirically observable at the enterprise level. It is, however, certainly within the aims of the project not to limit its analysis of the consequences to the level of individual enterprises but to draw more general conclusions. These general conclusions will, however, likely be of another nature than one would expect in a situation of generalisation of case study results on a national basis. In such a situation the problem of generalisation usually refers to the question whether the observed outcomes of the technological change in individual cases can be transposed to a higher level and form an adequate basis for making forecasts in a given national situation. In an international comparative research, however, the problem of making more general statements does not in the first place refer to this kind of generalisation (extrapolation, aggregation) but rather to the attempt to conceptualise the social mechanisms and processes which are underlying the observed outcomes themselves.

The simple description of differences and similarities of outcomes from national cases studies is therefore not what is meant here with international comparative analysis. That in fact only forms the starting point for systematic confrontations from which the comparative analysis develops. In this way a better understanding of the observed "consequences" implies the analysis of the conditions for introduction.

It must be stressed, however, that the present state of the debate does not make it possible to define, in advance, theoretically all the national and system characteristics to be taken into account. Under present circumstances we therefore had to choose a more modest approach. The international comparison we are undertaking should be seen as a process of search. Through the systematic comparison and confrontation of detailed case descriptions within differing national and system conditions the way could be paved for a creative analysis of relevant societal and system characteristics and mechanisms.

#### 4. Is East-West comparative research possible?

We shall reflect a little on the necessary conditions for a successful accomplishment as well as on the expectable barriers that we shall find on our way.

It is common to distinguish in this respect theoretical, methodological and organisational dimensions. It is also common, of course, to stress that these dimensions are very much interrelated, but for a first reflexion like the

present one it seems to be quite useful to separate them for the moment. What I would like to do now is to raise questions rather than to offer solutions.

First, then, with regard to theory. The most important condition for successful cooperation in any research project is that the participants do communicate on the same level, that is to say share the same basic paradigm. This is all the more true for an international comparative research. In this context "technological determinism" can be considered as such a paradigm. How does the situation look like among opponents of this traditional approach? Is the anti-technological deterministic approach well enough developed as an alternative paradigm?

In preparing the start of our project the main criteria for inviting research teams to join was exactly that potential participants should share a critical position towards technological determinism. During our almost two years of working together, however, it still is not clear whether all of us agree what to put instead. Various concepts are used and probably for the moment they more act as disguise for uncertainty rather than being clearly defined notions. Anti-technological determinism seems to be a starting point for most of us in search of a more convincing theory. What does link all the participants, however, is a strong interest in the reciprocal relations between society, technology and work.

In a situation like ours, where we have some kind of pluralism of concepts within a broadly shared paradigm it is impossible to define clear hypotheses as is usually prescribed by the textbooks.

We can explore, not test or prove anything and we accept this. There is of course some pragmatism underlying this position. We are working together and we should accept our limitations. However, there is also a more principal point to mention. This refers to the relationship between social research and social reality.

The science of science and the sociology of sociology has always stressed the links between the developments of research interests and theory and the changing social reality itself. When you bring together research groups from different countries this relationship becomes very obvious, evenmore when the research groups are coming from the different socio-economic systems. Concerning technology and work the research interests in the various countries are different as is the scientific debate and - more important - usually these debates are typical national and not very well known across the borders. This is especially the case where empirical research is involved. And this in turn has everything to do of course with different societal realities and societal interests with regard to the introduction of technology.

Just one example to show the relationship of social reality and social research. The introduction of micro-electronic technology in a country like the GDR or CSSR is principally a top-down process. To accomplish the political goal social research ought to contribute considerably. A major task seems to be to - so to speak - pave the way, to detect potential barriers and resistance, to assist in their removal and to help to avoid negative consequences. Interesting enough

a major barrier for introduction of new technology (or rather for any kind of change) seems to come from the management of enterprises.

The situation in capitalist countries is quite the opposite. Here, the initiative for technical change is to be found with the management of enterprises, at least they take the final and decisive decisions. They profit of course in varying degrees from favourable conditions created by the state, but in general - to continue our schematised way of presentation - it is a bottom-up process. The role and contribution of social research in this context is more diversified. Part of it is management oriented, but part of it is extremely critical and so are the research questions and research traditions. The implications for an international comparative research project are several.

First of all there is a great chance that a burning research problematic proposed by one team does not make any sense at all to the others. Secondly, the diffusion of new technology is extremely unequal within the various countries due to the different decision-making procedures and priorities set by them but also due to the different industrial structures of the countries. To illustrate this point it probably suffices to mention that we did not succeed in finding any of the East European teams (except the Yugoslavian) ready to investigate office automation, simply because its diffusion did not have high priority in their countries. Another example can be found with Deppe and Hoss who showed how the machine industry in the GDR and in Hungary have achieved different positions within the respective industrial structures and also very different levels of technical development, a.o. due to their position within CMEA (Deppe & Hoss 1983). Koistinen (1982) pointed out the important position of the wood industry in Finland because of which especially here efforts were concentrated to increase the technological level. All these examples show the importance of a profound apriori knowledge about the structure of industry, its status and technological climate and historical development for international comparative research. They, however, also indicate serious practical methodological problems, e.g. for the selection of enterprises and for the definition of matching criteria.

A third implication to be drawn from what has been said before is of a more principal nature. Given the different status of an enterprise within the two socio-economic systems and given the very different ways in which diffusion of a technological innovation takes place, do we not have to admit that the recent but growing popularity of what is called a "societal approach" is a typical western phenomenon, whereas some kind of systemic analysis has been quite common in East European countries? At least with regard to the formal influence of society on the enterprise. What then is the status of case studies in the two systems?

With the last question the methodological dimension is touched upon. One of the major and yet largely unsolved methodological problems is the micro-macro problematique. How to analyse the reciprocal relationships between enterprise and society? One way, of course is an international comparative research with a quasi-experimental design in which macro-characteristics can be varied and relevant micro technologies in different national system-settings. But what to control, if practical problems of finding matching criteria are huge and if - as shown - these very criteria (like size, technology, production process, product, etc.) are themselves so very much under the influence of society? Moreover, what to vary, if the characteristics at the macro level not so much refer to different values of the same variables but rather to

3 The concept of "societal approach" was first developed by Marc Maurice and his colleagues. See the publications mentioned under note 2. For an application of the societal approach in the field of new technology, see Eyraud, F. and Rychener, F.: Aspects theoriques et methodologiques de la comparaison internationale dans l'optique d'une analyse societale. Le cas des nouvelles technologies. Paper presented at the Third Training Seminar of the Vienna Centre, 1982.  
See also Lutz in this publication.

4 There is no reason of course to argue that international comparative research is the only way to accomplish this goal.

5 An attempt for a comparison between France and Poland within the societal approach had to be given up because of apparently too divergent societal conditions.

6 The project encompassed 4 subprojects. Two studies in industry (automotive and steel); one in banks and one on management information systems. The East-European countries only participated in the industry study. Publications from the project are:

Forslin, J., Sarapata, H., Whitehill, A.M. in collaboration with F. Adler and S.C. Mills (eds.): Automation and Industrial Workers. A fifteen Nation Study. Vol. 1 Part 1 (1979), Vol. 1 Part 2 (1981), Oxford.

Margulies, F., Martensen, L., Mills, S.C. and Tamasi, P. (eds.): Automation and Industrial Workers: optional study - Steel Industry: A cross-national comparative research. Vienna Centre 1982.

7 Besides these two empirical research projects the Vienna Centre was engaged in the area of technology and work also in other ways. In 1979 it organised the first east-west conference on the social impact of micro-electronics, see Berting 1980. It was involved in the coordination of the latest Club of Rome report, see Friedrichs, G. and Schaff, A. (eds.): Microelectronics and Society: For better or for worse. A report to the Club of Rome. Oxford 1982.  
The Centre also coorganised in 1981 a joint conference of South American and European scientists on the impact of Micro-electronics. A publication is in progress.

The present project is part of a larger programme of activities in the field of technology and work. This programme also entails three international workshops. One, held in 1982 in Italy, was devoted to strategies of health protection at the workplace. The second on changing Attitudes and Behaviours of Young People towards work will take place in the Soviet Union at the end of 1983. The third one will be organised in Hungary in 1984 and deals with new Forms of Work organisations and their socio-economic environment. These workshops will most likely be followed by a number of small conferences on related issues.  
Finally, the Vienna Centre is now preparing an international workshop on the methodologies used by the various disciplines of social science for assessment and evaluation of technological development. This initiative must be seen as a contribution to interdisciplinary cooperation.

8 In November 1982 the Vienna Centre in collaboration with the Yugoslav Centre for Self Management Edvard Kardelj, organised an international training seminar on cross-national comparative research where this question was the central topic. This section partly draws on the experience of this training seminar.