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Veröffentlichungsversion / Published Version

Sammelwerksbeitrag / collection article

Empfohlene Zitierung / Suggested Citation:

Kalleberg, R. (1987). Some scandinavian contributions to the field of technology and organization of work. In B. Lutz (Ed.), *Technik und sozialer Wandel: Verhandlungen des 23. Deutschen Soziologentages in Hamburg 1986* (pp. 85-108). Frankfurt am Main: Campus Verl. <https://nbn-resolving.org/urn:nbn:de:0168-ssoar-149330>

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Some Scandinavian Contributions to the Field of Technology and Organization of Work

Ragnvald Kalleberg

My purpose in this paper is mainly to present some central contributions from scandinavian social scientists in the broad and interdisciplinary field “society and technology” or “social and technological change”. Most of the scandinavian studies in this field have been related to work organizations and production technologies.

Essentially, I am going to present four broad research and (professional) development *traditions* in this field (hinted at with the keywords: stress, autonomous groups, trade unions and democratization) and some substantive *themes*, especially connected with information technology. I will mainly concentrate on empirical and contributions from sociologists.¹

1. Control, competence and contact in production systems

There exists an interesting tradition of research on different kinds of *production systems* in Swedish social science. The tradition originated in psycho-physiological *stress* research. Over the years, this approach has developed as a broad, inter-disciplinary effort, where concepts, methods and results from psychology, physiology, psycho-somatic medicine and sociology have been synthetized. An important part of this work, has been done at the university of Stockholm, in the Department of Psychology. One of the main contributors and the one most relevant for sociologists, is Bertil Gardell.

The *endurance* of this collective research effort, has been impressive. During the last 25 years, there has been produced a large amount of empirical

studies, especially focused on somatic and psychosomatic effects of production systems on operators *health* and on their general *activity* level, activity both inside the organization and general political activity outside. During the last 5 to 10 years, leading people in this tradition have become more oriented towards studies of workplace democratization.

In production systems Gardell especially underlines the importance of three general dimensions: control, competence and (social) contacts. The *control* dimension relates to “the locus of control” in work, the extent to which the operators work is controlled or regulated by their instruments or other factors in the organization. The *competence* dimension refers to the level of skill that the task requires of the individual. In some very sophisticated technical systems which can be operated very simply, f.ex. oil refineries, the competence of the operators may be very low. But the competence of people in staff functions has to be very high. The degree of social *contact* in the work situation is the third dimension. Some work situations are f.ex. designed in such a way, that it is impossible or very difficult to uphold networks of social support.

Some generalized and well documented insights, can be summarized around the keywords: overload, underload, control and contact. General negative characteristics of job content and design of production system, are first *quantitative overload*, as too much to do, time pressure, repetitive workflow. These are typical features of mass-production technology and routinized office work. Pace and pressure for effective use of time seem to increase with use of advanced technology.

The second trait is *qualitative underload*, e.g. too narrow and one-sided job content, lack of stimulus variation and no demands on creativity, problemsolving or social interaction. These jobs seem to be more common within settings (in both offices and manufacturing) characterized by automation and increased use of computers, even if opposite results may be found. The third feature is *lack of control*, especially in relation to planning, pace and work methods. The last is *lack of social support* from significant others. (Gardell 1982:34)

It is of course not unproblematic to interpret studies like these. A lot of different factors inside and outside the work situation influence on operators health status and activity level. But in the middle of the seventies, the research group found so to say a *critical case* with regard to the discussion of factors producing ill-health. They were able to locate a highly mechanized mass-production firm, where it was possible to keep most of the interfering factors under control. This was due to a remote location where people lived

under very similar conditions and stayed on their jobs, simply because there were no other jobs to get.

In this quasi-experimental and semi-longitudinal study, the research group was able to show that well-paid, healthy workers doing skilled evaluations during extremely short intervals (less than 10 seconds), under excessive pressure from the machine system, in a period of 5 to 7 years developed various forms of serious stress reactions, as well as nervous and psychosomatic illnesses. After comparing them to two other age-matched groups of workers, they were inclined to conclude that *lack of control* (over work pace, methods and physical movement), was the most critical variabel for the creation of stress and ill-health. (Gardell 1982:34-35. See also Johansson et. al. 1978)

This research-tradition represent a basic criticism of the scientific management tradition with its extreme recommendations of control of operators and specialization of their work. One of Gardells conclusions, is that this management approach also is irrational measured against its own premises. Operators that are working in production systems characterized by high levels of control, competence and contact, are better able to stand pressures than operators working in low quality work-environments.

The tradition of Gardell and his group is rather typical for a Scandinavian way of approaching the complex web of relationships between technical systems and other socio-technical factors in the operating core of an organization. *The technical system is generally viewed as only one of many important factors influencing the operators and the production system.* Other important factors are f.ex. wage systems, management systems, working hours, design of jobs, work groups and departments, union strength and national laws and agreements. The effects of technical systems or wage systems have always to be related to this context-specific interplay of individual, organizational and societal elements.²

2. The socio-technical and trade-union traditions

The development of scandinavian *socio-technical*, action-oriented research, began in Norway around 1960. On the research side, it was started up as a cooperative project between the Tavistock Institute for Human Relations in London and a group of Norwegian researchers located at the Work Research Institute in Oslo (strictly speaking: during a first short period,

located in Trondheim). On the user side, the Norwegian Employers Association and the Norwegian Federation of Labour Unions, cooperated in a project about “*industrial democracy*”. A central focus for experimenting and study, was the creation of *autonomous groups* among operators. From around 1970 a similar development took place in Sweden. There were also similar developments in Denmark, but it did not bring forth new experiences and insights compared to the two others. (Gustavsen and Hunnius (1981) and T. Sandberg (1982) give good overviews and a lot of references to relevant literature about these developments)

2.1. Norway: organizational choice

“When the Norwegian Industrial Democracy Project started in the early 1960s, it was the first research program in the world wherein employers and unions collaborated at a national level to find better ways to organize work” (Sandberg 1982:96). The two main persons from the research-side were Fred Emery from Tavistock and Einar Thorsrud from the Work Research Institute. The first four field-experiments took part in a wire drawing mill, a mechanical assembly plant, a pulp department and a fertilizer plant.

One of the main objectives of the experiments, was to demonstrate the viability of alternative forms of work organization. These should be based on more freedom and competence for the workers, under real conditions in working life. One of the basic means to reach such ends, was to reorganize the operative work into partly *autonomous groups*, based on group work and group decisions. The scientific and professional “importance of autonomous work groups is partly to be sought in the point that re-grouping of tasks and redefinition of work roles must generally be done on the level of the group, as most interdependent sets of tasks in modern service or production systems go beyond what can be handled by an individual”. (Gustavsen and Hunnius 1981:46)

It was surprising that the Norwegian Federation of Trade Unions and the Norwegian Employers’ Confederation decided to cooperate in a field where the employers traditionally had the right to make decisions. (In Scandinavian terminology, it is generally labeled the employers “steering right”, legitimated in property rights). Considering the traditions of the two organizations, it was also a remarkable fact that the key person in the project was a researcher from the outside. The general explanation of these development have to be traced back to – comparatively speaking – a

unusually strong, social-democratic movement, acting in a political system (“corporate pluralism”) where large and centralized organizations exert strong influence in the society.³

One of the experiments took place at *Hunsfos* Pulp and Paper Mill in southern Norway in the mid 1960-ies (see Engelstad 1979). The experiment aimed at increasing operators autonomy in their daily work with respect to tasks and decision-making. In effect the experiment demonstrated that work organization could be substantially changed from hierarchically managed to self-managed and that a partially autonomous work group could be established without any substantial change in technology. “Even though there was no fundamental restructuring of the management hierarchy as a whole, this experiment in the mid-sixties was one of the first to demonstrate the possibility of *organizational choice* within the same technology” (Elden et.al. 1984).

A core element in the socio-technical tradition, is to view work roles and work organization in the light of the tasks and task-interdependencies which technology generates. Neither technology nor tasks are, however, taken as given. A certain technology generally lends itself to different definitions of tasks and task relationships and hence to possibilities for *organizational choice*. For such “joint optimization” of technology and social organization, the well known “psychological job-requirements” have been used to evaluate or guide the design of new technical systems or new organizational arrangements. (Gustavsen and Hunnius 1961:46)

The four field experiments did *directly* inspire organizational development along similar lines in about 50 firms up to 1980. The developmental and research efforts have been located in branches like shipping, hotels and restaurants, banks, off-shore operations in the North Sea and state-ministeries. The *indirect* dissemination through national agreements between the main employer and employee organizations and by means of laws, have however been more important as a “diffusion mechanism” than the “power of the good example”.

There has been conducted quite a lot of research of different types, surveys, case-studies, evaluations and action research, to describe, analyse and strengthen these developments. A national, representative survey (conducted in 1981) identified high rates of participation in Norwegian working life. The study showed f.ex. that two thirds of the full-time employees reported about cooperative arrangements in their firm and one third had themselves been representatives for the employees in committees and other positions. This picture is also in accordance with the comparative

results from the IDE-project, which indicate that the degree of local, worker participation and influence in Norway may be second only to Yugoslavia in a European context. (See Gustavsen/Hunnius 1981, Kalleberg 1982, Lafferty 1984, IDE 1981:153)

2.2. *Sweden: Technological choice*

At the end of the 1960-ies, quite a large group of Swedish managers was interested in reorganizing production work on a group basis. In a Swedish study of this, it is stated that: "When the projects finally began in 1969, the time was more than ripe. The spark that ignited the flame was the publication of the report on the Norwegian program in early 1969 . . ." (Sandberg 1982:174. The report hinted at, is Emery and Thorsrud). Group organization was a central feature in the overall development. In the same period, there was an important shift in wage systems from variable to fixed systems and from individual to group wages. "From 1965 to 1975, the proportion of pure piece rate systems dropped from 46% to 18%" in the industrial sector. (Sandberg 1982:171)

If the keywords for the innovating element in the Norwegian development have been organizational choice, the characterizing words for the Swedish contribution are *technological choice*. The most far-reaching changes in technical designs and job designs took place in the assembly projects, such as those at Sicla, Saab-Scania and Volvos Kalmar plant. "The new elements in the technical system both at Saab and at Volvo was the replacement of a fixed-pace assembly line by a non-paced trolley for each engine or car. . . . The abandonment of the machine-paced assembly line in these car-producing plants, was perhaps the most radical new approach that was generated in this sector" (Sandberg 1982:192).

The number of firms directly affected by this reform movement was probably somewhat higher in Sweden than in Norway, but the difference is not at all that dramatic that some social scientists have believed. If 50 firms were affected in Norway, maybe around 100 were affected in Sweden.⁴ It is maybe unnecessary to note that the main tendency in the organization of non-professional work in Sweden as in Norway and Denmark, is (still) based on some modification of traditional economic and technical principles underlining the importance of specialization and standardization of work and centralization of influence and power. (For Sweden, see f.ex. Berggren 1980)

2.3. *Trade-union projects*

Another parallel tradition in Scandinavian research and development, thematically oriented towards, information technology, was started in Norway in 1971 as a cooperation between The Norwegian Computer Centre and The Iron- and Metal-Workers. Characteristic for this project was the cooperation with only the employee side. This project also inspired and strengthened similar types of projects in Sweden and Denmark. As time has passed on, in Norway it has become rather difficult to see the differences between the more consensus-oriented socio-technical work and this somewhat more conflict-oriented tradition. The Swedish and Danish variants on the other hand, seems to have been somewhat more heavily marked by a (partly marxist inspired) conflict – tradition. (Fossum ed. 1983, Å. Sandberg 1982, 1984)

Experiences from the first Norwegian trade-union project and the Industrial Democracy Program, inspired what was probably the first data-agreement in the OECD-area, in a Norwegian firm in 1973. Some central elements were information-duties for the employee, the right to choose data-stewards and the employees right to participate in the planning and implementation of new information technology. (See Keul in Fossum 1983)

These developments were quickly disseminated on a national scale through agreements and laws, in both Norway and Sweden. (For an overview, see Gustavsen 1985). The first national data agreement between employers and employees came in Norway in 1975. I will come back to some of the effects of these arrangements in the next section about information-technology, but first I will put forward two comments related to the socio-technical and trade-union traditions.

2.4. *Technology and work*

Three well known “schools” in the debates about technological and organizational development, can be characterized with the concepts *upgrading, degrading and polarization* of working conditions. Well known and much discussed authors among scandinavian social scientists in this connection, are Blauner, Braverman and Kern/Schumann. It is reasonable to regard the socio-technical tradition as a fourth position in this debate about the consequences of new technology on work-conditions and work environments. This tradition has received important new contributions

from Scandinavian social scientists, who have been especially innovative in the area of field-experiments (action-research) and (professional) organizational development. (See f.ex. the evaluation made by Whyte 1983 and Whyte 1984, ch. 10 and 14)

The main insight from this tradition can be formulated quite simply: *New technology often tends to create possibilities for upgrading of the work environment if that is one of the important goals for the developing and implementing actors.* (It is of course understood that once technological installations are finished and buildings built, there are introduced a lot of constraints of both a technical and economical character). One primary focus is on the *intentions of actors*. The many Scandinavian experiments during the last two decades have shown that there exists far more possibilities for organizational and technological choices than is generally believed, both in traditional management thinking and in some of the “critical” approaches in sociology.

2.5. On research, action and professional work

Disciplines such as law, medicine and psychology have a long history of both being sciences and professions. The professional element of a academic discipline refers to the concrete use of scientific knowledge, insights and techniques in order to solve problems for clients (cf. Lysgaard 1982). Traditionally this fact has created some tensions and conflicts. Those between clinical psychologists and experimental psychologists are f.ex. well known. The conflicting parties have accused each other of being (respectively) unscientific and irrelevant.

As a discipline, sociology has a tradition of being only or mainly a science. The continuous engagement in professional organization-development among Scandinavian social-scientists has therefore created some strong tensions inside the discipline. Some questions have been: Is this sociology? Is this scientific or is it rather politics or social work?

One of the conflicts has had to do with the status of “*action research*”. It has happened that professional, developmental work has been characterized as “*action research*” by the practitioners, even work which has not resulted in any publication, not to speak about publications meeting minimal criteria (to f.ex. documentation and systematic argumentation) set to a scientific publication. The argument seems to have been that what researchers are engaged in, must be characterized as research. The debates about this

question has been rather heated at times, maybe especially in Norway and Sweden.

In my view, in an educational reform last year in the Department of Sociology at the University of Oslo, these tensions were for the first time formally tackled in an adequate way by one of the academic Departments with primary responsibility for the transmittance and developing of the discipline. One of the new requirements to the graduate students, is that they have to *practice* for three months in realistic field situations and f.ex. work in a group with responsibility for organizational development in a hospital. As the first Department in Scandinavia – and probably in Europe, as far as I know – the professional role was institutionalized as a basic role in the discipline, together with the research role, teaching role and “transmission” role (i.e. transmission of scientific knowledge and insights to the public at large).

Sociology is then understood as a *comprehensive discipline* (or “Fach”), built up around four basic intellectual missions: scientific research, teaching in study-processes, transmission of knowledge and science-based, professional activity (as planning, evaluation, community and organizational development). The experiences from the sociotechnical and trade-union traditions, have been of great importance for this development and explication of a professional role. (For some more information and arguments see Kalleberg 1986)

3. Information technology: consequences and influences

During the last few years, there has emerged something of a new interest in the field technology and society in Scandinavian social science. One of the tendency has been to go outside the work-place and look at technology in settings like the family and the impact of technology on leisure activities. It is typical for the new trend that the field “*technology in daily life*” has been selected as an important field for national support in Danish social science. (Cf. Knudsen ed. 1983, Cronberg 1986)

But most of this research is in progress. Much more has up to now been published on the general theme *new information technology* in working life. During the last years, there has been a widespread and intense interest in the development and consequences of new information technology. Also in Scandinavia quite a few have interpreted the situation as a fast-moving

technological revolution, transforming the industrial society into a post-industrial, information society.

In this section, I first look at some research on *consequences* of new information technology on work environments and on employment. I then look at some of the experiences of employees and unions, trying to *influence* on the implementation and development of this technology. The section is finished with some general remarks on the issue "information revolution".

3.1. Consequences of information technology on work environment and employment

Classical industrial work-environment problems like noise, heavy lifts, poisonous chemicals and dangerous machines, are not associated with micro-electronics. On the contrary: micro-electronically controlled robots may take over work that is heavy and dangerous. For reasons like this, some Danish contributors have characterized information technology as "nice". (Schieflo and Sørensen 1986:194)

But some studies indicate that this technology has introduced new work-environment problems and strengthened some old ones. "Waiting stress" is a phenomenon that has emerged with the new technology. When operators and their clients or customers have been accustomed to the high speed of this technology, waiting time is quickly felt as stress. One does not know when the picture will come and one tends to be sitting, looking at the display unit. The combination of uncertainty and expectations of quickness, create waiting-stress (Lie and Rasmussen 1983:69). Work at video display units has become rather usual. A Norwegian study shows that office workers using such equipment, tell about less variation in tasks, more stress and a more strenuous ergonomic situation (Thoresen 1982).⁵

There exists quite a few studies of the introduction of new information technology and its consequences in office work. It is impossible to draw a general and representative picture of the Scandinavian situation on the basis of these studies. But one rather common trait seems to be that the implementation strategy chosen, has been characterized by small steps, fitting the new technology into existing divisions of labor and authority. One consequence of this approach is that new possibilities often are not grasped. This was articulated in the following way in a study: Word processing was not introduced as an integrated system with new possibilities of handling

texts and numerical material. It was rather introduced as new and better type-writers (Pape and Thoresen 1982).

The most discussed problem related to the consequences of new information technology, has been the danger of mass *unemployment*. Rather speculative predictions of decline in employment from one third to one half (of the total work-force) in the service and manufacturing sector, have been presented. Let us have a short look at some of the empirical studies in this field. A study of Norwegian municipality is interesting in this connection. New information technology was introduced rather slowly and the gains in productivity – which were considerable – were used to increase the production of services, increase quality and introduce new services. (Maus in Fossum ed. 1983) A Danish study of the implementation of EDP-technology in the administration of Danish municipalities, showed that in 9 of 10 cases, the new technology had no consequences on the number of jobs inside the local administration (Braendsgaard m.fl. 1984, quoted in Schiefloe and Sørensen ed. 1986:159). The number of employed people in Norwegian banks, finance and insurance increased from 47 000 in 1978 to 57 000 in 1984, in a period where large investments in information-technology were made (*ibid.*).

The technical possibility of automated offices has probably come nearer. But at the same time, the demand for information and information-processing increases. Maybe the so-called *Xerox-effect* is typical in many contexts. If the volume of copies had remained stable, many office-workers would have lost their jobs. Instead the machine led to an almost explosive growth of copies, and maybe stimulated the creation of new jobs.

A researcher at the Norwegian Computer Center (Nord 1983, quoted from Schiefloe and Sørensen ed. 1986:161) studied all work organizations in a municipality, both in private and public sector. His general conclusion was that the effects of the new technology on the labour market had not been strong and probably wouldn't be so in the foreseeable future. In this report it was stressed that one of the main reasons for that, was the character of a number of the jobs. The work requires much more *personal evaluation* than is often supposed in predictions about the possibilities of automation. It is difficult to rationalize away this element of context-specific discretion and delegate it to machines.

The importance of such concrete evaluations, was also underlined in a broad study of office automation, conducted at the Norwegian Institute for Social Research in Industry. One of the conclusions of this study, was that predictions of great reductions in the number of office-workers have partly

been based on onesided and incomplete evaluations of office-work. Two of the elements that the predictors often have not understood, are the element of *discretion* in such work and the element of *hidden service work*. A computer may set up beautiful letters and compute at a fantastic speed, but it cannot create and uphold social contacts, store informal knowledge about clients or suppliers. (Lie and Rasmussen 1983)

3.2. *Influence on the use of information technology*

Before we look at the concrete experiences with these new arrangements, let us have a short reminder of some central elements in the *industrial relations system* of these “social-democratic states” (Lafferty 1984). Sweden as well as Norway – and to a smaller degree Denmark – are characterized by a high degree of *organisation* in the labour market, approximately three quarters of the employees are union members. Chief actors in the labour market are, on both sides, large *federations* covering a number of national unions, respectively employer associations. The chief regulating mechanism between the unions and the employers, has been the *Basic Agreements*. They first emerged in the 1930-ies and contained rules about the right of organize, the right to elect representatives and about negotiations. In principle, these agreements in their modern form, have two main parts, one pertaining to ordinary negotiations and the other to cooperation between employers and employees.

In addition to negotiated agreements, *legal regulation* of labour relations has also existed since early in this century. In the 1970-ies the legal regulations were strongly expanded. In Sweden in this decade a whole batch of laws was passed, including the Co-determination Act. The basic principle of this Act is to impose an obligation on the employer to negotiate with the workers before any substantial change affecting the workers is made. In Norway, the Work Environment Act of 1977 came to include a section on organization of work, thereby giving legal sanctioning to the idea that work should provide people with a reasonable opportunity for developing competence and experience in the making of decisions. To some extent these laws reduced the relative importance of the agreements and in Sweden the collaboration part of the Basic Agreement was terminated upon union request. (Gustavsen 1983: 35. Gustavsen 1983 has given a good overview of most of the relevant agreements and laws).

The agreements about local development of information technology are rather new. There exists quite a few case-studies of these developments, but

there are few studies of the overall impact of these agreements. The largest study I know of, was conducted at the Institute for Social Research in Industry (Nilssen 1984). It covered 59 enterprises in Norway in the iron- and metal-industry, mostly located in private sector. Both management and union representatives were interviewed. If we take the answers from the unionists to be empirically realistic, it seems to be the case that in almost half of the firms there is real participation and in one fourth of them it is possible to have a real chance of influence. (Taken from Schiefloe and Sørensen ed. 1986:216-217. For a general overview and evaluation of this field, see Gustavsen 1985).

This study and some others are confirmed by a number of studies of the implementation of the work environment act, especially studies from Norway and Sweden. The studies show that quite a number of the requirements are followed, and quite a lot of the rights are made use of by the employees. And it is worth stressing that some of these rights are far-reaching, e.g. the right for safety-stewards to stop dangerous work. If the safety steward so do, it is not possible for the employer to reverse such decisions with reference to the prerogatives traditionally following ownership-rights. If the employer and employees are not able to work out a local agreement, the Labour Inspectorat (under the Ministry of Labour) has to take the decision (Kalleberg 1982).

3.3. The revolution that disappeared?

The new information technology has inspired quite a lot of authors to paint with a broad pencil dramatic scenarios for the near future of our societies. The fundamental question has been: Is there a dramatic revolution going on, changing our economic, political, social and cultural life? Many have answered in the affirmative. Some of these have pointed to trends going in the direction of unemployment, political centralization (a well informed, "big-brother state"), cultural commercialization and citizen passivity. Others have underlined trends pointing towards new employment, decentralization of political power and cultural creativity and pluralism.

However, the most usual answer from Scandinavian social scientists, is: No, there is no such revolution going on. At least not yet. So surely, some of the short-term predictions were plainly wrong. I think that maybe the typical counter-question these days, is the following: Is this the revolution that disappeared? (Cf. the representative overview of the effects of new

information technology in Scandinavia, where Schiefloe and Sørensen (1986) have chosen this question as the title of their book).

4. A conclusion and some challenges

Which are some of the important *challenges* in this field? My guess is that new, important achievements (inside the discipline of sociology) will not first and foremost come in the form of new and refined models and studies of “new technologies” and their effects on “workers” located in unspecified “firms” and “societies”. There will surely be a focus on the empirical *theme* technology and organization, but probably the related themes of power and culture will be more important. A fourth research and development *tradition* is strongly connected to these two last-mentioned themes.

There is a need for more clarity and consistency in the understanding of “technology”. In my view there is also some need of more simplicity in the conceptualization of technology. There is a need for more clearly specified typologies and empirical studies of different kinds of “operators” in different kinds of “organizations” located in different kinds of “societies”.

I will take up some aspects of these broad issues in this last section of my paper, organized around the five following headings: technological and organizational choice, a comparative understanding of organization, power, culture and a comparative understanding of societies.

1. Most Scandinavian social scientists have for quite a long time abolished two presuppositions often connected with *technological determinism*. The first is the tendency to treat technology as an autonomous and independent factor. Or said in the variabel language of survey research: to treat technology as an independent or rather, *the* independent variable in the explanations of organizational change and design. The second is to assume that technology has clear and precise effects, independent of other factors in the internal and external environment of work-organizations. The prevailing view among Scandinavian social scientists, is to consider the development, implementation and use of technology as influenced by (and influencing) a complex set of social factors and to claim that the consequences of new technology have to be understood in the interplay with other important “forces” and factors in an broad institutional context.

This is maybe the most important general conclusion to be drawn from many Scandinavian studies in this field. Formulated more positively, there has been a focus on the possibilities for *organizational and technological choice* in working life. This theme has to a large extent been studied in the contexts of field experiments and action research. One of the elements that has been very well elaborated, is some *professional* consequences of these insights in the form of a professional role for social scientists, models for organizational development, professional techniques and ethical guidelines (f.ex. underlining the importance of – and difficulties in intergrating – good work environment, productivity, democratization and democratic dialogue).

In the discussion of organizational and job-design, there is often made references to *technological and economical imperatives*. It is f.ex. often claimed that requirements for effectivity and profitability, make it necessary to develop and uphold highly specialized and controlled jobs. But social scientist should contribute to broaden such discussions, at least with one new set of imperatives: namely *socio-cultural imperatives*. The character of the design of organizations and jobs can to a large extent be explained with reference to socio-cultural traditions: Hierarchies are built and jobs are specialized because that is prescribed in the traditions influencing working life, and especially socio-cultural, managerial traditions.

Let me just give a single illustration. In one of the departments in a Norwegian industrial firm, there were some years ago introduced quite a lot of improvements in the physical and social work-environment. These changes were rather dramatic and happened without changes in economic situation and inside the same production-technology as before. The most important factor in the explanation of the change, was a shift in “managerial culture” in the firm. One could generalize the insights from this case and say that: One of the “iron laws” hindering a more rapid change in Scandinavian working life, is the sociocultural managerial traditions which define tayloristic and oligarcic arangements as “most natural” (see Kalleberg 1985).⁶

The theoretical elaboration (inside this field) of the importance of intentional, innovative and creative, actors, is up to now however, rather weak. An interesting possibility is to make use of rather elaborate insights gained in quite another field of discourse: the elaborated debates about the status and tasks of the social sciences (often called the debate about “positivism”). I think of the debates started up with the Norwegian philosopher Hans Skjervheims (1957, 1959) important contributions (see Habermas 1971:163) which initiated a “shift of paradigm” in Scandinavian

theory of science. (In a Nordic context, this shift was in a way ratified by the Finnish philosopher von Wright in 1971). There is f.ex. much to gain by using (the Norwegian sociologist) Østerbergs (1976) “metasociological” insights about human actors, their intentions and innovating capacities. (This field has already gained much from the use of “meta-sociological” insights about the “critical” and “liberating” tasks of social science, cf. the third point in this section about power-phenomena and the democratic tradition in Scandinavian research and development).

2. Too many of the scandinavian studies have made use of too simple categories of “firms” and “workers” and about the effects of “technology” on these social phenomena. There is much to gain with more differentiation, (but in my experience: not too much), not least in the possibility of a more systematic use of comparative perspectives. It is possible to get much of this in a somewhat more comprehensive and differentiated theory of work *organizations* than is often used. Let me just give a few hints about what I am thinking about. (In this context, I make use of Mintzbergs (1979) synthethizing effort in the interdisciplinary and rather fragmented field of organizational research).

Let us call the people producing the primary commodities or services in a work organization for *operators*. It is often of great interest to distinguish between professional (as medical doctors or psychologists) and non-professional operators. It is also often fruitful to distinguish between operators producing in bueraucratic organizations and those producing in non-bureaucratic (e.g. flexible, project-organized) organizations. But there is often also fruitful to distinguish between different kinds of bureaucratic organizations.

Standardization characterize the operative work in a *bureaucracy*. But there are important differences between the bureaucratic, standardized work of professional doctors in hospitals and the standardized work along an assembly line. The first kind of work is placed in the operative core of a professional bureaucracy, the second in a machine bureaucracy. Both these kinds of organizations have administrative hierarchies with line-managers and top-managers, built up upon the producing, operative basis. But the power games and power structure in these two kinds of organizations are radically different. The typical situation for the operators in the machine bureaucracies (and this is a valid in the industrial as in the service sector) is that they have little power whereas the operators in the professional

bureaucracies (as hospitals and high-schools training engineers and economists) are very powerful.

It has sometimes been claimed that the concept of “*technology*” is too broad to be of any use research. Following Hunt, Mintzberg (1979:250) focuses on the technical system, the “collective instruments” used by the operators in an organization. Mintzberg identifies two “dimensions” in this technical system. First a regulation dimension, which refers to the “extent to which the operators work is controlled, or regulated by the instruments”. Extremes along a continuum is the surgeons scalpel and the assembly line. Second a sophistication dimension, which “describes the complexity or intricateness of the technical system, namely how difficult it is to understand”. Complex, sophisticated instruments may be easy to operate (like a car), while simple, unsophisticated instruments may be difficult to operate (like the surgeons scalpel). “Thus we would expect the highly sophisticated technical system to require an elaborate support staff. Nonoperating specialists abound in the chemical company; they are few in the distillery” (Mintzberg 1979: 251).

On the basis of such models and concepts, it is possible to formulate some rather general and well substantiated (in a lot of empirical studies of organizations) (hypo)theses, f.ex. the following two.¹ “The more regulating the technical system, the more formalized the operating work and the more bureaucratic the structure of the operating core” (p. 261).² “The automation of the operating core transforms a bureaucratic administrative structure into an organic one” (p. 264).

3. It is an old insight that *power*-structures and patterns of influence are of great importance in the choice, development and use of technology in an organizational setting. This has been a much studied field and a heated ground for debates in international sociology during the last 10-15 years. Some catchwords are class, control and contingency theories. A few good contributions to synthesize the field with regard to organizations, have been published during the last years (as Pfeffer 1981 and Mintzberg 1983). There has been a convergence-tendency in Scandinavian working life studies during the last years. People originally belonging to different traditions, have moved in the direction of some sort of common platform, characterized by a *post-positivist* stress and social construction of organizational and technological realities, *normative*, (*rational*) *argumentation* and *critical-constructive* analysis of power phenomena. The new approach can best quite simply be labeled a *democratic research- and development-tradition*. (Cf. Gardell

1882b, Gustavsen (in progress), Kalleberg 1984, 1986 and Lafferty 1983)

It is in this connection symptomatic that some researchers deeply embedded in the socio-technical tradition no longer use the well-known psychological job-requirements as some sort of quasi normative basis for research and developmental work. They instead specify criteria for democratic dialogues as the central elements in a normative-empirical basis. (Gustavsen 1985, Gustavsen and Engelstad 1985)

In Scandinavian sociology on work and organizations, there has been a tendency to treat the ownership structure and the connected governing or influence rights, as constants. (This has by the way, been the case in much organizational sociology generally. Cf. Whyte 1983.) There is now, however a certain tendency to focus on ownership structures and treat them as variables. This should follow quite logically from normative-empirical treatises of the subject (as Dahls from 1970 and 1985) and comparative studies of work-organizations with varying ownership-structures. A fascinating possibility in Scandinavia in the course of the next years, is action research, this time not on and with self-managing (autonomous) groups, but self-managing firms.

4. Organizations are (also) socio-cultural constructions. Organizational *cultures* and subcultures generally have a strong influence on the choice, implementation and use of technology. This is of course an old speciality in sociology, easy to trace back to our old and new classics. It is maybe necessary to say this explicitly, considering the new enthusiasm for corporate cultures and its often unreflective assumption of providing sensationally new insights. Quite a lot of the insights in this literature, were, for example, formulated in an eloquent way 30 years ago by Selznick in his "Leadership and Administration".

One of the interesting new approaches in Scandinavian sociology, is to look at so to say the linguistic creation of organizational cultures. In order to study democratization processes, there has f.ex. been developed concepts and models of *democratic dialogues* as generative mechanisms for the creation of new cultures and structures. Among others, the works of Habermas on discourses, have been important in this conceptual and practical development in Scandinavian social science (see Gustavsen 1985 and Kalleberg 1982, 1984). Some of these new insights have been transformed into strategies for organizational development (Gustavsen and Engelstad 1985).

5. Development and use of technology in work-organizations takes place in a wider *societal context* than the work organization. In order to understand what is going on in work life, its preconditions and consequences, it is necessary to understand the specific traits of this wider context. Quite a few of the most fascinating studies done during the last years, have been comparative studies, designed to grasp such historic specific traditions and institutional arrangements. A well known example of this research, is Robert Coles (1979) study of automobile industry in Detroit and Yokohama. There has been produced a number of works about the specific character of the Scandinavian countries during the last years. Let me just end my presentation with a short reference to one contribution inside this field.

A Norwegian political scientist has developed a model of the Scandinavian system labeled a "*social democratic state*" (Lafferty 1984). The two prototypical cases are Sweden and Norway and the model may also be used on Denmark and Austria. Following Lafferty, the social democratic states have six distinctive features.¹ Proportional representation in the realm of the political.² Corporate pluralism with structural decision-making access.³ Democratization of production.⁴ Equality and welfare.⁵ A large public-sector "class".⁶ Rather extensive control of capital and investments. "There is no claim made that the features in question are not present in other systems, merely that other systems . . . will not show the features to the same degree and combined effect" (Lafferty 1984:124).

He stresses the importance of such models to make us more sensitive to specific societal factors and claims that it is not fruitful to subsume Sweden and Norway under the same model as can f.ex. be used for the United States. His general point is that fruitful scientific studies f.ex. of the preconditions for and the consequences of technological development has to be related to such a historic specific model of the Scandinavian countries. In his article from 1983, he has given good arguments for not expecting workplace-democratization to the same socio-political effects in Scandinavia as in the United States of America (discussing Greenbergs fascinating studies of some worker-owned plywood companies on the west coast of the U.S.).⁷

Notes

1 This means that I will not focus on relevant theoretical studies, f.ex. the one presented by the Norwegian philosopher Jon Elster (1981) about types of explanations of technical changes. Neither will concentrate on typical historical studies, f.ex. the fascinating study done by Hanisch (1980) describing and analyzing the three great transformations (sails, steam and motor) in Norwegian shipping from 1840 to 1940. It also would have been tempting to present some of the Scandinavian classics in this area, f.ex. the “father of Norwegian sociology” Eilert Sundt (1817-1875) and his “natural selection theory” of technical change (see Elster 1981, 135-138).

It is maybe unnecessary to say that no one really has a detailed and comprehensive overview of all the Scandinavian – that is: Swedish, Danish and Norwegian – contributions in this broad field, myself included. For my part, I have a fairly good knowledge of the Norwegian scene. I know less about Swedish contributions and least about what haven been published by Danish social scientists. It is should be rather easy to recognize this state of affairs when reading the paper.

2 The tradition is also of great interest because of its *methodological* achievements. During the last years, the concept of “triangulation” have become popular in methodological discussions in sociology. The basis idea is to combine different methods in research projects, for example surveys, observations and intensive interviewing. This has been practiced for many years in this Swedish tradition. In a study of 600 workers in 15 saw-mills f.ex., they used expert ratings of job demands, the workers own assessments of their jobs and of its effect on their health and objective medical evidence (for example amount of adrenalin and cortison in the blood and information from medical doctors). (Cf. Gardell 1982:34).

3 Thorsrud himself explained that LO and NAF – the two main organizations representing employers and employees – had confidence in him for personal reasons, derived in large measure from the mutual resistance against the Germans during the war (T. Sandberg 1982:104). See also the article where Thorsrud crossed his own tracks, stressing the importance of the national consensus, around 1960 still alive after the German occupation (1984:344). – In the mid sixties, the Norwegian sociologist Stein Rokkan published his famous article, describing and analyzing the Norwegian political system as a “numerical democracy and corporate pluralism”.

4 In discussions of the Swedish experiences, it is often underlined how exceptionally many firms that were engaged in this reform movement. But there does not exist any precise and reliable evidence on the scope of the reform movement. Most of the experiments were organized and financed locally in the firms, and the main initiative came from the employers. People working in the Swedish Employer Confederation have mentioned that around 500 firms in one way or another were in contact with these experiments. But it seems to be the case that these are the total number of firms in a file in the Confederation. This

file also includes firms that only have had vague plans of experimenting with group organization of work and the informations are not publicly accessible. My impression is that most of the sociological energy that has gone into more or less ingenious explanations of the differences between the two countries in this would have merited a better cause.

- 5 Some operators and researchers wonder if the problems connected with video display units, have to do with radiation from the screen, with static electricity and unstable pictures on the screen. For the time being, such hypotheses are neither confirmed nor disconfirmed. But in any case it will be difficult to specify and prove that certain pressure factors have certain negative consequences. The typical situation in analyzing a work environment, is that a lot of pressure factors interact and it is difficult to say that any one in isolation create a certain problem. Other important factors in office work, are f.ex. humidity, temperature, lightening conditions, ergonomic design of the terminal, working load, leadership style and design of working-hours. The important thing is the sum of the pressure-generating factors and how this relate to the employees capacity to tackle it (see Gustavsen and Hunnius 1981 and Kallenberg 1982).
- 6 Zerubavels (1985, ch. 2) fascinating analysis of the French and Russian revolutionary attempts to replace the "religious" 7-days week with "rational" and "socialist" 10 and 5 (and 6) days weeks, shows how adequate the metaphor "iron" can be with respect to the power of certain socio-cultural traditions.
- 7 Much of this literature is used and debated in the Danish sociologist Esping Andersens latest book "Politics Against Markets. The social democratic road to power" (1985). Another important contributions has been published by the Norwegian sociologist and political scientist Olsen (1983). Among other things, he gives (in the first chapter) an interesting discussion and empirical testing of a hypothesis about a "legitimation crises" in "advanced, capitalistic societies". His conclusion is that this hypothesis at least is not valid for "the case of Norway".

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