

ESTABLISHING MULTISKILLED TEAMS - LESSONS FROM DANISH CONSTRUCTION

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ABSTRACT

The paper presents experiences with multiskilled teams at building sites in Denmark. The article develops a two dimensional typology of the characteristics of multiskilled teams. One is focussing on the process of establishing the team, another focussing on the content of the new work organisation. The work organisation is characterised by the degree of autonomy, overlapping skills and redesign of supporting functions. The process of establishing the teams is characterised by project and change management, degree of involvement and inclusion, training and gaining resources. Case material from three state-funded demonstration project is used to analyse how potential barriers for reorganising was overcome in the process. The cooperation with unions, training and the design of one central team, the site and logistic teams, proves crucial. A chief barrier in Danish construction is that working in a multiskilled manner still is a very limited general skill. But segregation of design and execution also produce problems. Moreover multiskilling is rarely used under pure market conditions, it is still an organizational innovation mainly developed with state subsidization.

KEYWORDS

Multiskilling, Planning, Organizational Change, Construction

1. INTRODUCTION

Teamwork in construction has a long history and is nevertheless considered a contemporary organizational innovation. Groups of craftsmen working in teams or crews have been the fundamental work organisation unit at the sites for a very long time. In contrast multiskilled teams have only for the last twenty years been considered a tool for further flexibilization and efficiency.

The paper presents experiences with multiskilled teams at building sites in Denmark (Boligministeriet 1997,1999 a.o., "Boligministeriet" is the ministry of housing). The article develops a typology of the characteristics of multiskilled teams focussing on the degree of autonomy, overlapping skills and redesign of supporting functions (see also Procter & Mueller 2000). This typology is linked to an evaluation of a team establishing process. Case material from a state-funded demonstration project is used to analyze how potential barriers for reorganizing were overcome in the process. The cooperation with unions, training and posing specific selection criteria for the quotations is discussed. Experiences from the establishing are compared with other Danish and international experiences (Hass et al 2001). It is pointed out that a chief barrier in Danish construction is that working in a multiskilled manner is still a very limited general skill. It is not developed as part of the basic crafts-education. Moreover multiskilling is still not an organizational form used under pure market conditions, but an organisational innovation on the way. The paper builds on theoretical concepts developed in Koch & Buhl (2001).

The paper is structured as follows. After a presentation of the method used, the concept of teamwork is discussed. This general description is then developed into a typology of characteristics of multiskilling. A case of establishing multiskilling is presented, followed by a discussion, where the case is compared with other Danish cases as well as US-cases. The paper ends with a conclusion on the central learnings from the Danish experiments.

2. METHOD

The theoretical approach is interpretative sociology, combining in a multidisciplinary fashion element from organisational sociology (Procter & Mueller 2000) with theory on organisational and technical change (Dawson, 1994, McLoughlin, 1999).

The main source of empirical material is an ongoing ex ante study of the building process planning to use multiskilled teams. Doctoral student Judith Marton and the author carry out the study. The study is formally attached to the case- project as a process -and result evaluation.

The establishing phase of the project contains a new element regarding the composition of the players, which traditionally encompasses the consulting engineer, the architect and the builder. Earlier experiences with a similar case showed that ignoring the trade unions as active participants in the establishing phase led to certain conflicts between them and the project initiators. In the new case, the unions have been involved from the beginning, and their role, among other things, is to elaborate efficient and acceptable wage contracts for multiskilling.

A bundle of methods is mobilised in the study. The design process is followed by participant observation. Interviews are carried out with key players. The project documents are used in the study as primary empirical material. The process has been followed from august 2001 and is still ongoing, which means that the results have preliminary character. The current phase of the building process is elaboration of the detail project, which has to be done by March 2002. There has been by now followed eight meetings and made twelve interviews covering a period of four month. The project is planned to continue further two years, of which the building period is planned to be six month.

The experiences from the main case are compared with other cases using multiskilled teams at building sites in Denmark (Bologministeriet 1997,1999 a.o.) and internationally (Burlinson et al, 1998, Haas et al, 2001).

Two limitations in the present paper should be noted: First, it is not discussed, or further underpinned, whether enhanced decision latitude in teams automatically implies better work for the participants. A significant body of literature actually questions this (see Findlay et al 2000). *Secondly*, the potential occupational bias from the author towards the players in constructions is not analysed in detail (see Loosemore and Tan 2000). It can be noted that both DTU-participants share the professional background as engineers with a multidisciplinary education and training in management and organisation.

3. CONTEXTUALISING TEAMS

The concept of teams and /or teamwork stems predominantly from the manufacturing industries, but has spread to IT, public sector institutions and, as it will be discussed below, construction. The concept remains ambiguous and contested (Tranfield et al., 1999; Procter and Mueller, 2000; Findlay et al., 2000). The content is different in different contexts. This variation can be interpreted as part of the development and implementation of a concept of enterprise change. Studies of organization concepts point to “interpretative viability” (Ortmann, 1995; Benders and van Bijsterveld, 2000; Koch, 2000b), i.e. The ability of reinterpretation and reshaping of the idea of change are necessary in order to enable the building of coalitions around change.

Teamwork was promoted in Denmark in the nineties, mainly as an integral part of organization concepts such as the learning organization (Senge, 1990), but also drawing on the socio-technical tradition within Scandinavia (Buhl, 2000) and as part of a union policy. The union’s concept is called “developmental work” (LO, 1995). Teamwork has become common in the rhetoric of contemporary enterprise change and Danish labour market vocational training units have a well-established set of training activities to assist enterprises in establishing teamwork (Erichsen 1995). Teamwork can improve working life through decentralization and skill enhancement, and it has also been promoted

for productivity and efficiency reasons (Nielsen, 2000). The number of Danish manufacturing companies using the concept *did* increase throughout the nineties although the absolute proportion is still low, namely around 20 % (Csonka, 2000). It should be added that European studies are in the same range (Benders et al 1999).

Across different contexts and settings one can distinguish between two ideal types (Weber, 1968) of teamwork that we consider mirror the bandwidth of concepts used (Koch & Buhl 2001, Benders et al., 1999). These two ideal types are:

- *Strong teams* is used to describe the quality of working-life reform-like driven changes of shop floor organization. The employees are empowered, and they experience enhanced decision latitude.
- *Weak teams* is used to describe the management-recipe driven type of teamwork organization which is frequently characterized by little development of autonomy and decision latitude, little skill enhancement and an implementation process crudely characterized by top-down approaches.

In the *strong teams* empowerment is not only rhetoric but also a partly realised practice with grouping of tasks, development of skills and enhanced decision latitude. Moreover it is characteristic that the indirect production functions, such as production planning and scheduling, management of materials, repair and maintenance are designed to support rather than control the teams (Schumann et al., 1994). In its complete version, first-line supervisors are re-trained to counsel the teams or to enter other positions in the enterprise. The planning and scheduling personnel are instructed to bundle production orders and allow for shop floor scheduling, quality procedures are changed, some repair and maintenance tasks are transferred to the team, team members participate in design and product development (Sederblad, 1993). Strong teamwork is considered to be the most “developmental” (LO, 1995) and humanistic variant with a high degree of decision latitude (Karasek and Theorell, 1990, Storey 1992,95 Legge 1995,98) at features like the allocation of tasks, the amount and quality of products, the execution methods used and spatial positioning. In sociotechnical, industrio- sociological and work environment perspectives this is understood as a certain degree of autonomy (Koch and Richter, 1991; Schumann et al., 1994; Buhl, 2000). It also encompasses enhanced skills within the team and corresponding “soft” roles for the production planner and first-line managers. Introducing and using teams of the *weak* type has become integral to a series of management recipes and practices, and it is characterised by a prevailing management prerogative and managerial control. It is included in TQM, BPR, Japanese-inspired production and Lean Production to mention a few. The management trend towards teamwork probably started with Japanese inspiration (Nielsen, Møller and Koch, 1991; Elger and Smith, 1994). As the archetype within this ideal type is a team formed with a grouping of tasks, possibly with job rotation, but with little autonomy in sociotechnical sense (cf. Procter and Currie, 2000, Findlay et al 2000, Mcloughlin 1999). This type of team usually has formal team leaders and direct supervision. The indirect production functions are largely unchanged or “frozen” (Tranfield et al., 1999).

When Danish construction industry and institutional players within this sector are considering implementing multiskilled teams, they thus operate within such a bandwidth between weak and strong teams. Both types exists as practical templates in other industries operating in Denmark, and in international construction industry; compare for example Haas et al-s (2001) description of multiskilling in US construction with Greens (2000) Anglo-Saxon discussion of human resource management in lean construction. It is however a local and contextual issue to design a team in a firm or in a construction project.

4. MULTISKILLED TEAMS IN CONSTRUCTION

In this section a two dimensional typology of the characteristics of multiskilled teams in construction is developed, also drawing on experiences with teams in general. One dimension is focussing on the process of establishing the team, another focussing on the content of the new work organisation.

4.1 The Process of Establishing Multiskilled Teams

The process of establishing the teams is characterised by project and change management, degree of involvement and inclusion, training and gaining resources. From change management and innovation process studies it can be noted that *gaining resources* for the process is important (Mcloughlin et al 2001). Haas et al describe *central process elements* to be a conscious company strategy of implementing multiskilling, followed up by bidding procedures,

training and appropriation of reward systems (Haas et al 2001). Moreover certain actors are important to include. Dawson points at the features of the establishing process as political involving choice, negotiation and coalition building (Dawson 1994). In his teamwork case the top-level management support is not only something one has to obtain in the beginning of the process, but also something that has to be reestablished at certain critical instances in the process. From general experiences with establishing teamwork one would usually point at the importance of involving the employees (Buhl 2000), giving substantial training in especially soft skills such as cooperation and conflict solving (Erichsen 1995) and establishing changed roles for supportive functions such as foremen, supervisors, planners, purchasers, stock managers and others (Koch & Buhl 2001). Haas et al moreover recommend negotiating with unions as part of the establishment. Establishing multiskilled teams could generally occur from two angles. Either a builder and/or a technical consultant describe this organisational form as part of the project. Or it is included in a contractor strategy and developed from there. In both cases it is a central characteristic of the construction that the further developments become very dependent of cross company alliances and cooperation.

4.2 The Work Organisation of the Team

The work organisation is characterised by the degree of autonomy, overlapping skills and redesign of supporting functions. Jägbeck 1994 and Tremblay 2001 thus describe different aspects of autonomy on several levels. At the operational level *autonomy* encompass the team member's possibility of choice of progression of tasks, distributions of tasks among members, choice of time and space for the work, the tools and methods used. On higher levels it is issues like recruitment to the teams, longer term planning, reward systems and the like. Autonomy is frequently not dealt with directly during the planning phase, but can for example be addressed by describing the different roles of the team and their surroundings (Erichsen 1995), for example in a written social contract.

With a much more restricted understanding Haas et al describes the central content element in multiskilling as task allocation and *overlapping skills*. This is described through the two ideal types "four-skills-helper" and "dual skills". The governance and normative dimensions (Findlay et al 2000) are at Haas et al relatively traditional; the foreman plays a central role in allocating tasks and developing culture in the teams are not discussed as central. The scope is single companies, which employ the whole row of classical crafts. The governance issue is usually in a broader sense a question of *redesigning the supporting functions* in a way where the supervisor's are withdrawn from their previous more direct intervention form, and where planners might be engaged in developing more frame-like plans bundling tasks and covering say a week instead of planning every single task. The supporting functions and the personnel related to them might be redesigned in such a way that new activities and jobs needs to be found to them. Finally, the normative dimensions are described by Findlay et al (2000) as a question of fostering a team culture (se also Tremblay et al 2001). This issue is not furthest dealt with here.

5. CASE

The case is a renovation project of an apartment building in central Copenhagen, Eskildsgade 38. The organisation responsible for these renovations, the urban renewal company, was in the mid nineties part of a multiskilling project in another house in the same area. Although the results of this first project were not unambiguous, the company decided to apply for public support for another project developing further the results from the first. The ministry for housing did grant the project funding. The funding was however limited to the evaluation, since the ministry found that previous project experiences ought to be considered as sufficient to carry through a new similar case. Hence, the ministry contended, that the project did not need funding for the development of the multiskilling concept as such.

The technical advisor, an architect firm, hired for the construction task, and the consulting engineer company hired for the development task of the multiskilling experiment, were actually partners in the previous project. The initial configuration of companies and members in the project thus implied that mutual trust and experience were present.

The technical advisor for the building case developed a project for the renovation, describing the necessary tasks to be carried out and calculations for the costs of these operations. Cooperation between the two technical advisors developed the proposed work organisation.

This group decided early on, to include representatives of the relevant craft unions and employers organisations in the steering committee of the project. These representatives were included in order to enable a necessary redesign of

contracts to support the multiskilling. Moreover, a research project from the Danish building research institute running in the same period established a committee of actors involved or interested in multiskilling. This constituted another more overarching arena for developing ideas and solutions for the project.

A pre-qualification tender for participation was announced and seven contractors applied. In the material it was specified that there should be the following five teams:

- Roof
- Facade and windows
- Toilets and bathrooms
- Staircase and apartments
- Site and logistics

These teams represent a cross cutting of traditional organisation. Each of them will thus encompass several crafts. In the tender it was moreover specified that the foremen's experiences with new work organisations and collaboration should be specified in a curriculum vitae. Finally it was specified that an evaluation should be carried out. The applications from the companies did not reveal a strong engagement in the new work organisation proposed. One company included however a general text on its engagement in new organisational forms. Five contractor companies were appointed to the second round of tender.

During the design, there was a continual discussion about which task allocation and organisation would be optimal; especially the issue of sufficient volume of tasks, and the roles of the site and logistics team were discussed intensely. At the end of the design period followed, the first team was changed into a roof and cellar team, through a proposal of the second technical advisor.

The site and logistics team was apart from more traditional tasks such as cleaning assigned important supporting functions: planning of manning different tasks, controlling of human and other resources used and the purchasing of material. This team thus is supposed to carry out traditional site management tasks, which can be seen as granting autonomy to the teams. On the other hand the further supportive functions was not included in the design work.

The contract and wage issue were dealt with in cooperation with the industrial parties. It was contended that it would be too complicated to design an entirely new wage systems for the teams. Moreover health and safety- issues were discussed with the union representatives, preparing the obligatory health and safety plan for the building site.

Training of the multiskilled teams was also debated. The unions and some of the institutional actors present argued that training in soft skills would be essential. On the other hand the technical advisors and the urban renewal company has trouble with finding resources for this purpose. And especially one of the technical advisors saw a contrast between an initial information meeting and training in the soft issues. The technical advisor was committed to the former, but in doubt about how to handle the latter. Two alternative training models were developed by one of the institutional actors. The project group has finally adopted the "smallest model", which implies one day training, although there was a general agreement that further training could be arranged if funding could be found outside the project.

6. DISCUSSION

The discussion encompasses two elements. Firstly, the typology developed before is used to structure the discussion. Secondly, two further examples of Danish multiskilling experiments and some US experiences are used to develop the points in the discussion.

The case exhibits certain important *process features*: first and foremost the initial network of actors has previously cooperated, which create a climate of mutual trust. The other Danish cases do not mention such previous cooperation patterns. In contrast the US-cases depart from firm-strategies, Which Haas et al (2001) sees as crucial. In the case the established network decides to *include unions and employers* and finally an early inclusion of the evaluators. The inclusion of unions implies early treatment of the wage issue and health and safety issues. This result is, mirrored in one of the other (and previous) cases, Istedgade 47 (Boligministeriet 1997) and in the US- cases (Haas et al 2001). In the Istedgade 47 case the experience was, that the start of the project was a little conflictual,

because the unions had not been informed (Boligministeriet 1997: 22). Haas et al reports positive experiences with inclusion of unions in his six cases. However, the Lillegade case does not mention unions or the contract issue (Boligministeriet 1999). The inclusion of evaluators enables an ex ante- process-, and result evaluation to be carried out.

The *gaining of resources* in the case was in the phase studied not entirely successful. As mentioned the project suffered from limited funding, only supporting the renovation and the evaluation of the multiskilling experiment. The training issue has been linked to the issue of finding more resources. If those are not found the training will be limited to one day.

Training the teams in soft skills such as problem solving and collaboration has to be funded outside the project in the case. In one of the other projects, Lillegade, there is given positive evaluation to the introduction day, which a combination of an introduction to the project and training in group working. The training encompassed collaborative exercises and the writing of a social contract between the parties (Boligministeriet 1999:11). The craftsmen afterwards (Boligministeriet 1999:31) give these activities positive evaluations.

In the process of establishing the multiskilled team there is a tendency of a "substitute" problem. The established network of technical advisors, the builder, the unions plan and develop sometimes in detail how the craftsmen and team members are going to act and work on the site. The established network thereby plans how the main contractor and other contractors are going to work on the site. There is a classical segregation of design players and production players, which time and again are mentioned as chief barriers for innovation in construction (Gann 2000, Winch 1998). The selected contractors in the case further underline this: they hardly mention multiskilling in their bids for the job, despite the attempts to check contractor's ability to use this changed form of work organisation through the demands in the restricted prequalification tender. Whether the winning contractor will have a strategy of multiskilling is thus dubious. If this happens the contractor will have to develop it before the construction work starts.

The main *content* elements of the present case are fourfold. First, the four teams with functional tasks; roof, toilets etc. Second, the planning and controlling tasks of the site and logistic team, which normally are external support functions. Third, the idea of broader participation in coordination meetings during the renewal period (production on the site). Fourth and final, a change of the *wage* system proposed to be combination between existing craft oriented piece-rate contracts and a common bonus system. This way of making task allocation resembles pretty allocation resembles pretty much the previous case carried out by the same network (Boligministeriet 1997). Where as the other Danish case and the US- cases are focused in other ways. The Lillegade case had a strong focus on coordination meetings, which were exercised rigorously. Nevertheless the experiment still reports several examples of cooperation problems, such as electrical and heating installation colliding with each other in practice (Boligministeriet 1999:23). Haas et al reports two strategies of multiskilling: four skills helper and dual skills (Haas et al 2001: 634-5). The four skills helper strategy divides the tasks on the site in four major groups and each worker is allocated primarily to such an area and supposed to help in another. The dual skill strategy groups the work in pairs and workers are trained to master both. It can for example be electrical and insulation work. Moreover economic reward and motivation in US-examples relates to firm strategies such as guaranteed hours and higher regular wages. These strategies are not found in the Danish experiments.

Since the case so far only encompasses the planning of the establishment of multiskilled teams, it is not possible to communicate much about *results*. It is planned however to be able to document the economic results as part of the evaluation. The other cases give an impression of the possibilities. The previous case (Boligministeriet 1997) is reported to be feasible for two teams. These results are however regarded by sector observers as dubious. The Lillegade case reports "not unambiguously good" economic results (Boligministeriet 1999:7, 25). The economic *results* of implementing multiskilled teams in US are reported to be feasible on market conditions (Burlerson et al, 1998). Other aspect of results such as work environment, cleaning, quality and upskilling are across the cases reported as positive.

7. CONCLUSION

In the process of establishing teams the cooperation with unions and employers, training of participating employees and partial withdrawal of supervisors can be seen as the main lessons from the Danish cases. Nevertheless the

examples do not constitute an unambiguous picture of a Scandinavian strong team approach as outlined above (see also Tremblay et al 2001). Actually the autonomy issue and the actual content of the multiskilling are tackled differently in the Danish cases. For example the design of one central team, the site and logistic team, proves crucial in the case studied, whereas Lillegade does not encompass such a team. Another example of deviance from “Scandinavian strong teams” is the relative little occupational training offered during the establishment. It derives from the discussion above, that there are many ways to do multiskilling. These variants underline the need for addressing a number of issues during the planning in order to direct the actual organization of multiskilling so it fits with the given tasks.

It is interesting to note that US-construction companies engage in realising multiskilling as a firm strategy encompassing several human resource elements. Seen in this light it seems to be a chief barrier in Danish construction that no construction firms seem to adopt the strategy. Another important barrier is that working in a multiskilled manner still is a very limited general skill across firms and crafts. This skill could be developed as part of the basic education of craftsmen. Finally multiskilling is rarely used under pure market conditions. This organizational innovation is still mainly developed with state subsidization.

8. REFERENCES

- Benders, J., F. Huijgen, U. Pekruhl and K.P. O’Kelly (1999). *Useful but Unused; Group Work in Europe*. Luxembourg: Office for Official Publications of the European Communities.
- Benders, J., Mueller, F., Procter, S., Van Hootehem, G.(2000). Preprints 4th International Workshop on Teamworking (IWO), Katholieke Universiteit, Nijmegen Business School.
- Bertelsen N. H. (2001). Notes for udviklingsprojektet ”Den selvstyrende byggeplads”, By og Byg.
- Boligministeriet (1997). Multisjak i byfornyelsen .Bygge og Boligstyrelsen: Projekt Renovering. Projekt no. 35.
- Boligministeriet (1999). Multisjak -nye samarbejdsformer i byfornyelsen .Bygge og Boligstyrelsen: Projekt Renovering. Projekt no 236.
- Buhl, H. (2000). *Hvor vildt kan det blive? Forankring af participation belyst gennem kommunikativ praksis i arbejdslivet*. Technical University of Denmark, Lyngby.
- Burleson, R.C., Haas, C.T., Stanley R., 1998, Multiskilled labour utilization strategies in construction, *Construction Engineering and Management*, vol 124 no 6 pp480- 489.
- Byfornyelsen (2001). forsøgsprojektet ”Den selvstyrende byggeplads”- Eskildsgade/2001-2003.
- Clausen L.& Bang H. (2001). Murerfagets udvikling - Barrierer og muligheder. By & Byg.
- Csonka, A. (2000). *Ledelse og arbejde under forandring. Om indholdet, udbredelsen og konsekvenserne af fleksible organisationsformer i danske virksomheder*, Copenhagen: Socialforskningsinstituttet.
- Dawson P. (1994). *Organisational Change: A Processual Approach*, Paul Chapman Publishing, London.
- Erhvervsfremme Styrelsen (2000). Byggeriets Fremtid – Fra tradition til innovation.
- Erichsen L.(1995) *Ledelse og udvikling af produktionsgrupper – et guldæg*. Industriens forlag.København.
- Findlay, P., A. McKinlay, A. Marks and P. Thompson (2000), ‘Flexible when it suits them the use and abuse of teamwork skills. In Procter, S. and F. Mueller (eds.), *Teamworking*, London: Macmillan. 222-243.
- Gann D, (2000). *Building Innovation. Complex constructs in a changing world*. London: Thomas Thelford.
- Green S. (2000). The Future of Lean Construction: A Brave new World. Paper presented at International Group of Lean Construction workshop. Brighton.
- Haas, T.C., Rodriguez, A.M., Glover, R., Goodrum, P.M.(2001). Implementing a multiskilled workforce. *Construction management and economics*. 19. 633-641.
- Jägbeck, A.(1994). Byggarbetslag – En studie av produktionsgrupper, Licentiatavhandling KTH Stockholm.
- Karasek, R. and T. Theorell (1990). *Healthy Work; Stress, Productivity and the Reconstruction of Working Life*, New York, Basic Book.
- Koch, C. & Buhl, H.(2001). ERP supported teamworking in Danish Manufacturing? *New technology, Work and Employment*, Vol 16, no.3. pp164-177.

- Koch C. & Richter A.(1991). *Working Conditions at Industrial Robots"* The Danish Work Environment Fund.København.
- Kreiner,K.(1976). The site organisation – a study of social relationships on construction sites, DTU. København.
- Legge K.(1995). *Human Resource Management: Rhetorics and Realities*, Macmillan, London.
- Legge K.(1998). *Human Resource Management*, Macmillan London.
- LO (1995). Work and development (English Publication), København, LO.
- LO (1992-97). Arbejdspakker om personlig udvikling, ledelse, kvalitet, uddannelse (Workpackages on personal development, management, quality, training).
- Loosemore M and Tan C.C.(2000). Occupational bias in construction management research. *Construction management and economics*. 18, 757-766.
- McLoughlin, I. (1999). *Creative Technological Change. The Shaping of Technology and Organizations*, London: Routledge.
- McLoughlin I., Koch C. and Dickson K. (2001). What's this "Tosh"? Innovation Networks and new product development as a political process. *International Journal of Innovation Management*. Vol 5 no3. Pp 275-298.
- Nielsen, K.T., Møller K.J.and Koch C.(1991), *Japanese inspired production systems and working conditions*, Copenhagen. The Danish Technological Institute.
- Procter, S. and G. Currie (2000), Interdependence not autonomy: Understanding teamworking and its impact. Proceedings 4. International Workshop on Teamworking. Nijmegen. 253-272.
- Procter, S. and Mueller, F.(2000). *Teamworking*, MacMillan Press. London.
- Sederblad, P. (1993), *Arbetsorganisation och grupper*, Lund: Lund University Press.
- Senge, P.M. (1990). *The Fifth Discipline; The Art & Practice of The Learning Organization*, London: Random House Business Books.
- Schumann, M., V. Baethge-Kinsky, M. Kuelmann, C. Kurz and U. Neumann (1994). *Trendreport Rationalisierung, Automobilindustrie, Werkzeugmaschinenbau, Chemische Industrie*, Berlin: Edition Sigma.
- Storey J (1992) : *Developments in the Management of Human Resources*. Blackwell. Oxford, 1992.
- Storey J (1995) *Human Resource Management- a critical text*. London. Routledge, 1995
- Tranfield, D., I. Parry, S. Wilson, S. Smith and M. Foster (1999), 'Teamworking: Redesigning the Organization for Manufacturing Improvements', *Technology Analysis and Strategic Management*, vol. 11,no. 2, 143-158.
- Tremblay D., Rolland D. and Davel E. (2001). Team-based Work Organization and the Devolution of responsibility to Employees: results of a survey conducted in Quebec. Communication presented at the IREC (Industrial Relations in Europe Conference); Madrid.
- Winch G. (1998). Zephyrs of creative destruction: Understanding the management of innovation in construction. *Building Research & Information*.Vol 26 no 5 pp 268-277.