

IMPLEMENTING MULTISKILLED TEAMS ON THE CONSTRUCTION SITE: DEVELOPING A SCANDINAVIAN MODEL?

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Teamwork in construction has a long history and it's nevertheless considered a contemporary organisational innovation. Groups of craftsmen working in teams has for long been the fundamental work organisation unit on the Danish sites, whilst multiskilled teams have only for the last few years been considered a tool for further flexibilisation and efficiency. The paper presents experiences with multiskilled teams within urban renewal projects in Denmark, but also relates about US cases that use multiskilling as a new labour strategy on the sites. A two dimensional typology of the characteristics of multiskilled teams is presented. One is focusing on the process of establishing the team, another on the content of the new work organisation characterised by governance, technical and normative dimensions, drawing on Findlay *et al.*, 2000 framework. The team establishing process is characterised by project and change management, degree of involvement and inclusion, training and gaining resources. Case material from three state-funded demonstration Danish projects is used to analyse how potential barriers for reorganising was overcome in the process. Cooperation with unions, training, and the design of one central site and logistic team, 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. Finally, it is discussed whether the contemporary innovation of multiskilling is a Scandinavian model of employee empowerment and participation (so-called strong teams), and /or represents a management driven innovation in prolongation of Japanese ideas of teamwork (so-called weak teams).

Keywords: multiskilling, Scandinavian approach, site management.

INTRODUCTION

The long tradition of working in organised teams or crews in the central crafts of construction, like carpentry and bricklaying or precast concrete element assembly, could mislead an observer to believe that multiskilling is no contemporary organisational innovation. Nevertheless multiskilling might represent exactly the break up of the traditional craft structure in favour of cross craft organisation, where the multiskilled team is considered a tool for further flexibilisation and efficiency of the construction site organisation. The new organisation strategy is arguably characterised by high degree of autonomy, process-oriented and cross-functional labour, which offers greater task variety and secures a flexible and coherent labour interaction throughout the project. The process of establishing the new work organisation and its content, are the two main analysing angles. The last mentioned is described by using Thompson and Wallace's (1996) teamwork model, characterised by three dimensions: governance, normative and technical. Case material is used to

analyse how potential barriers for reorganising were overcome. Co-operation with unions, training and posing specific selection criteria for the quotations are discussed. Experiences from three Danish cases [Boligministeriet (Ministry of Housing) 1997,1999] and similar US cases (Carley *et al.*, 2002, Haas *et al.* 2001) are compared. It is pointed out that a chief barrier in work optimisation in Danish construction is that working in a multiskilled manner is still a very limited general skill, in that it is not developed as part of the basic crafts-education. Moreover, multiskilling is still not an organisational form used under pure market conditions, but an organisational innovation developing under protected circumstances.

The paper is structured as follows. After a presentation of the method used, a concept of teamwork is presented positioning it between two poles: Japan and Scandinavia. This general description is then developed into a typology of characteristics of multiskilled team with main focus on the degree of autonomy, overlapping skills and redesign of supporting functions. Thereafter, the cases are presented, followed by a discussion about the developmental elements from both Danish and US experiments. The paper ends with the central learnings from the Danish cases.

METHOD

The theoretical approach is interpretative sociology, combining elements in a multidisciplinary manner from organisational sociology (Procter & Mueller 2000) with theory on organisational and technical change (Dawson, 1994, McLoughlin, 1999). The paper builds on theoretical concepts developed in Koch & Buhl 2001, describing the Japanese and Scandinavian approaches to teamwork.

The main source of the empirical material is an ongoing *ex ante* study of the building process, where multiskilled teams are planned to be implemented. Both authors follow the project from its early stage, being formally attached to it as process -and result evaluators. The case studied constitutes at the same time the central empirical resource for a university funded PhD study, carried out by doctoral student Judith Marton. A bundle of methods is mobilised in the study. The design process is followed by participant observation. Interviews are carried out with key players. Project documents, and meeting reports 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. There has by now been followed eight meetings held by the project advisory committee, and made twelve interviews covering a period of ten months. The latest stage of the project was the tendering and estimating round, which ended in May with the selection of the main contractor. During the following period further interviews will be conducted with the site players, and simultaneously, the work process will be followed through informal visits on the site and participant observation on site- and evaluation meetings.

Three limitations in the present work should be noted; First, the two preliminary Danish cases are analysed on the basis of secondary material. Second, it is not discussed here, or further underpinned, whether enhanced decision latitude in teams automatically implies better work for the participants, issue questioned by a significant body of literature (see Findlay *et al.* 2000). Third, 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 authors share the professional background as engineers with a multidisciplinary education and training

in management and organisation. The paper builds on and extends the analysis developed in Koch 2002 and Koch & Marton 2002.

COMPETING CONCEPTS FOR TEAMS: SCANDINAVIA VERSUS JAPAN

Teamwork stems predominantly from manufacturing, but has spread to other sectors such as IT, the public sector institutions and, construction. The concept remains ambiguous and contested (Tranfield *et al.*, 1999; Procter and Mueller, 2000; Findlay *et al.*, 2000), and 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 organisation concepts point to “interpretative viability” (Ortmann, 1995; Benders and van Bijsterveld, 2000; Koch, 2000b), i.e. These studies argue that the abilities of reinterpretation and reshaping of the idea of change are necessary in order to enable the building of coalitions around change. One can distinguish between two main ancestors of teamwork as it was promoted in Denmark in the last decade. One is the dominant form and integrates teamwork as part of management concepts such as the learning organisation, quality management and business process reengineering, broadly labelled the Japanese version. The other, which is much weaker in Denmark, draws on the so-called Scandinavian tradition with a sociotechnical heritage (Buhl, 2000), and is promoted by state governed development programs for industry as well as the unions. The union’s concept is called “developmental work” (LO, 1995). The number of Danish manufacturing companies using the concept in any of the many variants 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 thus distinguish between two ideal types of teamwork: *strong teams and weak teams* (Weber, 1968) that we consider mirror the bandwidth of concepts used (Koch & Buhl 2001, Benders *et al.*, 1999).

Strong teams is used to describe the quality of working-life reform-like driven changes of shop floor organisation. Employ empowerment is a partly realised practice with grouping of tasks, development of skills and enhanced decision latitude (Scandinavian teams). 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 adopt 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 and 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 1995, Legge 1998) measured in features like the discretion over 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.

Weak teams is used to describe the management-recipe driven type of teamwork organisation which is frequently characterised by little development of autonomy and decision latitude, little skill enhancement and an implementation process crudely characterised by top-down approaches (Japanese teams). The management trend towards teamwork probably started with Japanese inspiration (Nielsen, Møller and Koch, 1991; Elger and Smith, 1994). 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. 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 (Findlay *et al.* 2000, McLoughlin 1999). *Weak teams* usually have 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 operate within a bandwidth between weak and strong teams. Both types exist 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, although, there is one common and important sequence in this process – the technical division of labour, upon which the productivity of teamwork might be very dependent. (Findlay *et al.* 2000)

MULTISKILLED TEAMS IN CONSTRUCTION

In this section a two dimensional typology of the characteristics of multiskilled teams in construction is developed. This is provided by combining contributions on teams in general (Thompson and Wallace 1996), with contributions on multiskilled teams in construction (in particular Haas *et al.* 2001, Jägbeck 1994). One dimension is focussing on the team establishing process, another focusing on the content of the new work organisation.

The team establishing process is characterised by project and change management, degree of involvement, training and gaining resources. Haas *et al.* describe *central process elements* as a conscious company strategy in implementing multiskilling, followed up by bidding procedures, training and appropriation of reward systems (Haas *et al.* 2001). Moreover, Haas *et al.* recommend negotiating with unions as part of the establishment. Dawson (1994) points at the features of the establishing process as political involving choice, negotiation and coalition building. From general experiences with establishing teamwork one would usually point at the importance of employee involvement in the establishing process (Buhl 2000), giving substantial emphasis on the training, developing especially soft skills such as co-operation and conflict solving and establishing changed roles for supportive functions such as foremen, supervisors, planners, purchasers, stock managers and others (Koch & Buhl 2001).

The team-work organisation will in the following be analysed by using Thompson and Wallace’s model for team work (1996) that operates with three dimensions: *technical, governance and normative*, which are complementarily interrelated. The

emphasis is on the degree of flexibility, delegated responsibility and cultural cohesion available to employees. Findlay *et al.* 2000 emphasises the importance of the technical dimension in teamworking, which encompasses flexibility integration, by incorporating a range of additional competencies across the task, such as: analytical and problem solving (*diagnostic skills*), normative and behavioural (*soft skills*), and skills that are necessary to reduce the interfaces between operations. (see Fig. 1)

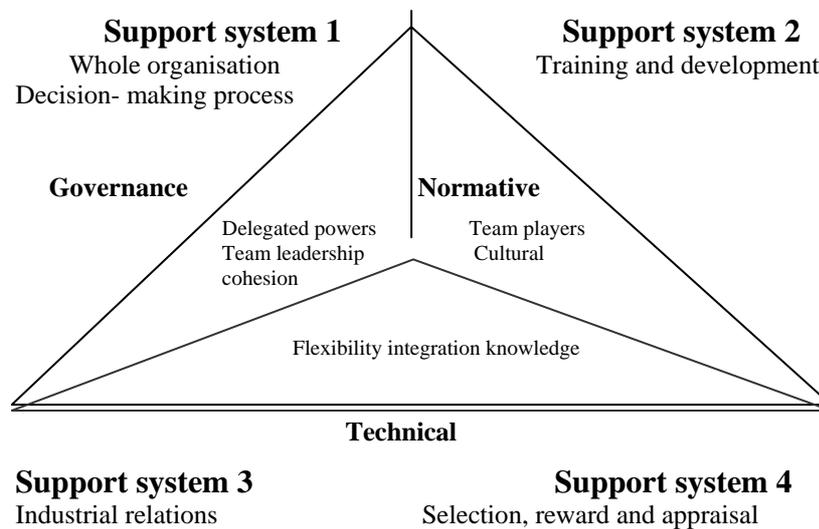


Figure 1. Teamwork dimensions model: Thompson and Wallace 1996, in Procter and Mueller 2000

To gain such abilities it's necessary to apply diverse educational and training initiatives like coaching in teambuilding, diverse courses for developing group dynamics, etc. that according to the concept should be provided by support system 2 and 3. The normative dimension relates to the "shaping" the employee behaviour within the team, by training and educational methods and different appraisal and rewards – supported by system 4 and 2. Findlay *et al.* (2000) describes this dimension as a question of fostering a team culture (see also Tremblay *et al.* 2001).

The three dimensions should enable both operational and subjective flexibility in the process of work, and offer insights into how workers participate in the process of modelling work-related responsibilities such as self-management and control, engagement and interpersonal behaviours.

The dimension of *governance* appears in Jägbeck (1994) and Tremblay (2001) as a description of different aspects of autonomy on several levels. At the operational level *autonomy* encompasses the team member's possibility of choice of tasks progression, distributions of tasks among members, choice of time and space for the work, the tools and methods used. On higher levels, there are encompassed issues like objective decision, project design and planning (time, economy, quality, safety etc), recruitment, reward systems etc., which Thompson and Wallace would see as part of the support system 1 and 4 that in our understanding also include production planners and foremen.

Haas *et al.* describe the central content element in multiskilling as task allocation and *overlapping skills*, which is a somewhat more restricted perspective. This is described

through the two ideal types “four-skills-helper” and “dual skills”. The *governance* and *normative* dimensions 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 company, who employs 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 that supervisors are withdrawn from their previous more direct intervention form, and the planners might be engaged in developing more frame-like plans, bundling tasks that cover say a week, instead of planning every single task. The supporting functions might be redesigned in a way that new activities and jobs are needed to be found.

THREE CASES FROM URBAN RENEWAL

The section discusses particulars of three Danish demonstration projects - the research case “Eskildsgade”, and two previously reported cases – “Istedgade” and “Lillegade” (Boligministeriet 1997,1999). All three cases are urban renewal projects and come within the developmental program “Renewal Project” launched by the Ministry of Housing in 1995. The Eskildsgade and Istedgade case introduces implementing highly autonomous multiskilled and cross-functional teams, and new logistic system as developmental issues, whereas the Lillegade case demonstrates new coordination structures and upskilling initiatives on the site. The organisation in charge for initiating the mentioned projects is the Urban Renewal Company, who at the same time is the client advisor and project leader in the case studied. As mentioned in the introduction there will be made parallels between the local experiences and US cases.

The research case

Although the results of the two previously reported cases were not unambiguous, the company decided to initiate a third demonstration project - the case studied, and applied for founding. The Ministry of Housing granted the project funding, however limited to evaluation only, since the ministry found that previous project experiences ought to be considered as sufficient practice and learning, so that players could carry through a new similar case. The project involves two technical advisors, both hired by the Urban Renewal Company. The architect, as usually, is responsible for the construction task, whilst the consulting engineer is in charged with the developmental task. Actually, the three firms networked together in the same role distribution on the Istedgade case. Thus, the initial configuration of the initiating group in the actual project implied that mutual trust and task experience were present. They decided early on to include in the project group other relevant bodies from the industry, such as craft unions and employer organisations, which was necessary in order to enable an efficient shaping of contracts to support the multiskilling. A pre-qualification tender for participation was announced and seven contractors applied. The announcement specified that the new work organisation should consist of the following five cross-functional teams: basis (basement and plumbing- and installation work on all fours), roof and façade, toilets and bathrooms, staircase and apartments, and site and logistics, which is a configuration that represents a cross cutting of traditional organisation. The tender also underlined that experience with similar work forms should be informed in the foremen’s curriculum vitae. Finally, it was specified that an evaluation task would be carried out throughout the process. This round of the tender ended with a selection of five contractors.

The task allocation and organisation issue arose several discussions during the design process; especially the issue of sufficient volume of tasks and the roles of the site and logistics team were discussed intensely. This 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. Thus, the logistic team would be responsible to carry out traditional site management tasks, which can be seen as granting autonomy to the teams. On the other hand the further support systems were not included in the design work.

The contract and wage issues were dealt with in co-operation 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.

The training and education issue has also dealt with intense negotiations, mostly regarding financial and education resources, and how to fit the training plan in the process in order to not affect the building time schedule, etc. The unions and some of the institutional actors present argued that training in *soft skills* would be essential. Finally, the project group has agreed about an education model, which implies one day for the introduction seminar, and twelve short sessions of training in teambuilding combined with follow-up activities that evaluates and reviews progress. The introduction seminar has the following purposes: first, to provide the team with general knowledge about the project, especially about its developmental part, making sure that the workers are convinced about the achievability of the objectives; second, to make sure that the new roles within the team are clearly understood; third, to outline the key role of the foremen in initiating and maintaining the work spirit and progress within the team; forth, to test a coaching exercise in teambuilding.

DISCUSSION

The analysis of the *process establishing features* is built on the typology developed in the previous section. The research case exhibits certain important process establishing features. First and foremost the initial project network has previously co-operated, which created a climate of mutual trust. The other Danish cases do not mention such previous co-operation patterns. On contrary, the US-cases depart from firm-strategies, which Haas *et al.* sees as crucial (Haas *et al.* 2001). The established project network decides to *include unions and employers*, which enhances the emergence of ideas and solutions, and also facilitates change management at this stage of the project. Moreover, the anticipated *participation of foremen and craftsmen in the work planning process* increases work engagement and responsibility. The inclusion of unions implies early treatment of the *wage, health and safety* issues. This result is mirrored in the Istedgade case, by experiencing certain conflict issues in the early stage of the project, regarding the project group's ignorance about including the trade unions in decision-making. The US cases report positive experiences with inclusion of unions. However, the Lillegade case does not mention unions or the contract issue. *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 evaluation. Training the teams in diagnostic and soft skills is funded outside the project. In the Lillegade and Eskildsgade project, the introduction seminar combines project introduction and training in team working. According to the Lillegade report the participants evaluated positively the content and the outcomes of the seminar

activities. The case also reports that during the construction period, there has been held trade-oriented courses, and courses for solving critical technical issues. Such initiatives are not suggested in the research case. *The wage negotiations*, in the case studied, was not entirely unproblematic in that there has not been completed a change of the wage system proposed. The result of the negotiations process was a combination between existing craft oriented contracts and a common bonus system. This way of making task allocation resembles pretty much the Istedgade case carried out by the same network (Boligministeriet 1997), whereas the other Danish case is focused in other way. Economic reward and motivation in US-examples relates to firm strategies such as guaranteed hours and higher regular wages.

The team establishing process in the case studied identifies a tendency of a "substitute" problem. Using a traditional competitive bidding, the project group elaborates a detailed project that afterwards, more or less, is adjusted by the chosen contractor before and during the construction. This is a classical segregation of design- and production players, which time and again are mentioned as a chief barrier for innovation in construction (Gann 2000).

The content of the work organisation is characterised by several items of the technical, governance and normative dimensions. Compared with the initial case, where the workforce strategy included 2 function oriented teams – roof, fungus, the main content *technical* element of the studied case is the design of 4 teams with functional tasks: basic, facade and windows, toilets and bathrooms, staircase and apartment. Training in teambuilding and different course initiatives during the execution constitutes relevant elements of both the *technical* and *normative* dimension. The US cases report two strategies of multiskilling: *four skills helper* and *dual skills* (Haas *et al.* 2001. The planning and controlling tasks designed for the site and logistic teams, that normally are external support functions, and broader participation (foremen and craftsmen) in site meetings during the renewal period (production on the site) are two essential *governance* elements in the cases. The Lillegade case experimented with had a strong focus on co-ordination meetings, which were exercised rigorously. Nevertheless, the experiment still reports several examples of work synchronisation problems, such as electrical- and plumber work collision. (Boligministeriet 1999:23). An other considerable *governance* tool in the working process in two of the Danish cases, is the "20 item system", which refers to a division of the building in 20 technical items, that enables a more precise following and registering of the workflow stage, thus facilitating the general overview of the work progression. In the Lillegade case can be mentioned two further governance tools within the work process: meetings for solving "technical knot-points" and the "common constitution" of the site, whilst the Eskildsgade case introduces sessions held periodically during the construction that combine work progress evaluation by using productivity- and work quality measurements, and coaching in teambuilding. Since the research 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 document economic and qualitative results as part of the evaluation. The other two cases give an impression of both possibilities and limitations. The Lillegade case is reported to be feasible for two functional teams. The case also reports "not unambiguously good" *economic results* (Boligministeriet 1999:7, 25). The results are, however, regarded by sector observers as dubious. Economic results with implementing multiskilling on the US sites are reported to be feasible on market conditions (Burlerson *et al.*, 1998), results built on modelled data, however. "Soft"

results regarding aspects as: work environment, cleaning, co-operation, co-ordination, communication, work satisfaction and upskilling were across the cases reported as positive.

CONCLUSION

The co-operation with unions and employers, training of employees and partial withdrawal of supervisors in the process of establishing teams 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 the Lillegade case focuses on education and coordination issues. The degree of occupational training offered during the establishment is still little, when making comparison with the “Scandinavian strong teams model”. 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 organisation 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 in the future developed as part of the basic education of craftsmen. On the other hand maintaining teams as a structure that combines several crafts might be a way to overcome resistance. The unions still mobilise resistance toward multiskilling as an individual profile, but favours teamworking as arena for multiple skills. If the Danish institutional players are successful in developing such a “collective” form of teamworking, it can be seen as a rearticulation of the Scandinavian tradition. There is however still some way to go.

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