Redesigning production through teamworking

Case studies from the Volvo Truck Corporation

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In this article we focus on the role which work organization in general, and which teamworking in particular, plays in the transformation of production in advanced manufacturing. Lean production has been the most influential model or label used to characterize manufacturing reform. The influential MIT study by Womack *et al.*[1, p. 99] claims that the work team is the heart of the lean factory. Drawing on the experience of Toyota and other Japanese firms and transplants, two key organizational factors are cited – the transfer of the maximum number of tasks and responsibilities to direct workers, coupled with an ability trace defects to their ultimate cause, both sustained by a philosophy which encourages labour to think and respond proactively to problems. Together they are held to constitute up to half of the overall performance differences of lean production plants.

Such attempts to harness the power of the collective labourer are the latest stage in the long debate in management theory and practice around the issue of whether the technical division of labour should be structured around the individual or the group. At one end of the spectrum has been Taylor's view that the group is the natural focus for worker self-organization and work restriction, hence the need to fragment tasks and individualize rewards. At the other, there is the human relations tradition, which, according to Littler, "represents the 'discovery' of that which Taylorism had been concerned to destroy – work-group solidarity"[2, p. 55]. The insight that it was necessary to accept the inevitability of informal organization and desirable to refocus group loyalty towards the formal organization, has been poorly understood and unevenly applied in organizational life, but the balance has now decisively shifted in the group direction.

In this context the rapid growth of teamworking is seen by radical and managerialist writers alike as a, if not *the*, central feature of manufacturing reform. For some, teams have replaced quality circles as the all-purpose change tool, with more than half of the major US corporations implementing some

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form[3, p. 42]. Others see teamworking as representing the hallmark of success across Japanese, Swedish and some US producers[4, p. 62], or the middle way between demands for higher efficiency and enhanced quality of work[5, p. 37]. If most commentators accept that teamworking is a central factor in the redesign of production, there is little consensus about its characteristic features.

The use of semi-autonomous work groups has been a consistent feature in some European firms and countries, particularly those influenced by a socio-technical or human-centred production tradition, notably in Sweden and The Netherlands. This tradition is written-off by Womack *et al.*[1] as a Utopian and doomed return to neo-craftsmanship, with particular reference to the most recent Volvo experiments at Udevalla. Negative comparisons between that tradition and the experience of Japanese transplants or joint ventures are also supported by Adler and Cole[6]. Noting both performance differences between comparable plants and the closure of the "flagship" Volvo plants at Udevalla and Kalmar, they claim that, "The conception of the autonomous work group, with its conception of technical and administrative freedom of the group, does not adequately support the kind of organizational learning we believe to be essential for sustained productivity and quality improvement"[6, p. 174].

In contrast, a variety of critics focus on the negative character and social costs of lean production, including the authoritarian use of groups[7,8]. Certainly, the highly formal, spatially restricted, and management-led basis of group work in Japan is substantially different from the German and Scandinavian experience[9]. However, to dispute the universal applicability of lean production as a "best practice" and reassert a different conception of teamworking which stresses autonomy and job enrichment[10-12], is different from a judgement that teamwork does not exist at all in Japanese plants[13].

Any attempt to assess rival claims about efficiency and competitiveness is beset by difficulties. Evaluating the arguments of Womack *et al.*[1] is made considerably more difficult by the absence of any detail about work organization, either with reference to lean production or so-called neo-craftsmanship. Nor is the closure of the two Swedish plants as definitive a judgement on the European model of work organization as Adler and Cole[6] claim. Issues of capacity, internal politics and the restructuring of Volvo in preparation for the aborted merger with Renault are arguably more important than any simple logic of efficiency[14,15].

More broadly, there is a danger in accepting a polarity between two traditions and practices, particularly where "lean" is appropriated for a specific production model, while a degree of "fat" is accepted as a precondition for making the workplace a "decent place for human activity"[11, p. ix]. Indeed, the new forces of international competition are compelling *all* the major players to become leaner and this is increasingly represented in the ideological as well as practical repertoire of management. The real issue is *how*? Even in the Swedish heartland of humanistic organization, the automotive sector reveals a full repertoire of production strategies in different production environments. Much of this bears little resemblance to neo-craftsmanship and images of bolting

together a large number of parts in a long cycle. Our case studies of the Volvo Truck Corporation (VTC) provide a practical framework for examining the development of teamworking in a variety of environments, which is of particular importance given the assumption in Womack *et al.*[1] that the team and flow line production are wholly co-terminous.

However, to avoid treating contemporary developments in terms of rival homogeneous blocs, we need an analytical framework which can identify the key dimensions of teamworking and how the particular configurations vary internally and with respect to their organizational and societal contexts.

Understanding teamworking

Many of the problems in understanding teamworking arise from using the term too generically to cover a variety of different concepts and practices. Organizational behaviour as a discipline has a historic and positive orientation towards groups as an ingredient to successful employee relations. Small-group activities are seen as a framework for human growth and self-development; sociability and participation; work restructuring via autonomy, feedback, variation and other classic ingredients of job enrichment; and cognitive and behavioural learning[16, pp. 4, 5, 69; 17, p. 14]. Discussion therefore tends to slip too easily back and forth between reference to teamworking, work groups, and cross-functional project teams.

There are, of course, continuities of theory and practice in this area, as the previous reference to the concern for autonomous work groups makes clear. But the dominant logic of such initiatives was a "humanization of work" shaped by the need to respond to labour market conditions and pressures for a more democratic workplace. When such conditions changed, "the debate on group work or manual assembly jobs had come to a dead end by the beginning of the 1980s"[18, p. 202]. It is important to focus on what is new and specific. As Jenkins[19, pp. 851-2] observes, the scale and scope of teamworking practices since the mid-1980s is qualitatively different and linked to a substantial restructuring of production systems to meet challenges from new markets and technologies, as well as perceived best practices from Japan and elsewhere.

The dominant emphasis is now instrumental. Teams are an instrument of redesign, not ends in themselves. That does not rule out different objectives and dimensions to the process. Teamworking is not a fixed package. Issues of the extent and nature of delegated powers, or whether socialization of team members plays any significant role, are contingent on a variety of national, corporate and local factors. We distinguish between technical, governance and normative dimensions, which will be discussed in turn.

Technical

Transforming the technical division of labour is the bedrock of teamworking initiatives. Integration through different forms of polyvalence and functional flexibility, self-regulation through delegated responsibilities for resourcing, scheduling and discipline, and a collective framework for the development of

expanded competences are the central mechanisms. In more ambitious forms the team takes full responsibility for continuous improvement, most often through internalizing and operating Taylorist work standardization systems[20, p. 8]. A key goal is that a teamwork system builds in a learning capacity which can sustain productivity and quality improvements[6]. Though the publicity goes to ambitious projects such as Saturn and NUMMI, we should be aware that integration and flexibility may not get much further than the transferring of quality and repair responsibilities from the end of the assembly line[21, p. 3]. Different forms and depth may reflect the variations in production systems themselves. It is harder to achieve substantial integration on conventional assembly lines and not all advanced manufacturing systems include just-in-time and other features of lean production. In fact it may be easier to introduce teamworking under conditions such as group technology and cellular manufacturing, as Dawson's[22] case study of automotive component manufacture in Australia shows. The difficulty of integrating teamwork functions into line assembly is one reason why some production systems are more dependent on off-line teams such as quality circles and special project groups. But regardless of the type of system, such off-line initiatives can be an important feature in diffusing practices within the overall learning process.

Governance

Variations in the shape and functions of teams may be related to goals in the governance sphere. Some organization theorists and practitioners still like to assert the old sociotechnical moral ideal of autonomy and core human needs for influence at work[23]. On the surface this appears to be reproduced in current managerial rhetoric that has a consistent and clear message: teamworking is a move away from the hierarchical command and control workplace, and the decisive means of empowering the employee[24, p. 30]. But most acknowledge that even in the more advanced initiatives, "there is seldom talk of democracy"[11, p. 25]. Expanded responsibilities and self-regulation, in whatever degree, is a functional requirement of the new production environments rather than a goal of participation and involvement *per se*[4]. In this light, there are three main governance issues:

(1) the extent of delegated powers over such questions as distribution of work, methods of production and allocation of new team members;

(2) the selection and function of team leaders;

(3) the relationship between team and wider organizational governance in the form of decision making and bargaining structures.

Normative

Once again we can identify a historic use of groups as a means of strengthening employee identification with organizational goals for example, in the first experiments with teams at Renault[25]. However, the normative dimension is

used within this context to mean something more specific: the changes in attitudes and behaviour necessary to make teamworking operate effectively. The production of "organization man" – selection, socialization and peer coercion through small groups – has long been recognized as part of the repertoire of Japanese corporations[26]. But it has been identified as a central factor by managerial and radical theorists alike in the West in recent years. Mueller[27, p. 386] argues that "Teamworking can be regarded as a modern attempt to re-align individual motivation with organizational rationality". In other words, it is a socialization device aimed at solving the classic problem of goal conflict and diversity undermining organizational objectives. This is perhaps pitching it too broadly. When Robertson *et al.*[8, p. 5] refer to the management of the Canadian CAMI plant envisaging a social system that reinforces production, or Dawson[22, p. 5] speaks of the creation of new cultural control systems that support collaborative workplace practices and "realign deviant behaviours", they focus more narrowly on the development of a form of vocational identity through training programmes and the dynamics of social interaction within the work teams themselves which enable employees to become *team players*.

Though both managerial and radical commentators have a tendency to present teamwork as a package, dimensions of teamwork can vary significantly. Particular configurations depend largely on how teamworking fits into the broader social and organizational context, and the predispositions and power resources of economic actors inside and outside the firm. Such interactions will create a series of overlapping *boundaries* affecting the working of teams with respect to all three dimensions. On the technical side, teamwork has to interlock with systems such as rewards and buyer-supplier relations. In terms of governance, teams have to transact with broader management decision structures, industrial relations systems and other features of governance of the firm. Finally, the normative dimension is shaped by interaction with corporate culture and the ideological basis of national social settlements. Once we have the means of disentangling the dimensions and boundaries of teamworking, it is possible to see how and why configurations can differ so sharply and therefore create quite distinct directions in the redesign of production. We now turn to our own case studies to illustrate these issues further.

Case studies

Our evidence is based on an analysis of Volvo Truck Corporation's (VTC) component and assembly plants in Sweden[28]. Though this focuses more specifically on the teamworking issue, the research is part of a wider project examining comparative patterns of work organization in the European commercial vehicle industry. Research methods were based primarily on semi-structured interviews with management across functions and levels in each plant, plus lay trade union officers. This was supplemented by observation and discussion with team members during site visits. Fieldwork trips were undertaken during 1993 and early 1994, with revisits to a number of sites in

September 1995. Our primary aims were to examine the goals of management and other actors with respect to work reorganization, and to develop a framework for understanding the variations and configurations in different contexts. In particular, sector characteristics matter for understanding the viability of different forms of work organization. For example, there are significant differences between the car and light truck market compared to that for medium and heavy trucks. With respect to the latter, customer demands are for longer product life, sophisticated breakdown and rectification facilities and greater customization.

VTC is a vertically integrated multinational organization, manufacturing and assembling the full range of commercial vehicles from 7.5 to 42 tonnes gross vehicle weight. Alongside the developments in Volvo's Kalmar and Uddevalla car plants similar experiments were taking place in its bus and truck plants in Gothenberg and Borås[11]. Although originally the predominant rationale was lower absenteeism and labour turnover, the current strategy links work organization to motivated workers, higher competence levels, and flexible production strategies:

> We have different work organization in all the different places here. In the end of the 1960s we had the problems in Paris and in Sweden there was a lot of strikes. After that the pendulum came over and the emphasis was on new work organization and new situations for the employees. Productivity was not necessary, only for us to have good people, to have human relations the best. We tested the ideas of work organization. But that was in the beginning of the 1970s. We were a little bit naïve in Sweden. We thought that work organization would resolve all the problems we had. I think the 1980s was better because we found the right level of work organization according to productivity. We have grown up (plant director, Skövde).

The truck market has seen an increased demand for customized vehicles, paralleled by the move towards lean production techniques in the automotive sector, which has influenced VTC to reconsider its production strategy across a number of different areas. Among the significant changes have been: examining the potential for delayering and taking out or redefining indirect labour; reacting to customer demand for customization by developing multi-dimensional production technologies; and the focus of our interest – restructuring work organization, with appropriate changes in reward systems. The development of reward systems based on competence ladders within each team is crucial to this process (see Table I).

Table I.
Typical competence ladder at Skövde

Competence level	Status	Time scale
Induction A/B	Trainee	3 weeks
C	One job	2-6 months
D	3-4 jobs	1 year
E	6-8 jobs and team leader	2 years
F	Inspector	3 years
G	Relief operator	3-5 years
H	Instructor	5+ years

This concern to develop a different type of worker and work system is potentially shared by the Swedish unions:

> You cannot work with a traditional work organization on our line you must have another type of person, another type of skilled worker than in traditional single machine systems. We cannot do exact work instructions for our type of machines, so you must work in another way, you must trust people, you must educate people, you must give them more responsibility to see over the whole system (union secretary, Skövde).

Nevertheless, the company is keen to ensure that this restructuring fits in with local and sector conditions. As we shall demonstrate, within certain common parameters each of the sub-sectors – components, foundry and assembly – have developed their own distinctive responses to business and process requirements. First we look at a process environment within the engine component plants at Skövde; second at those capital intensive, manufacturing sectors within the same plant and axle plant; and third the assembly of engines, cabs and the finished product within three Swedish plants (see Table II).

	A factory Skövde	D factory Skövde	Foundry Skövde	F factory Skövde	Köping	Umeå	Tuve
Team leader	Appointed	Rotating	None	Rotating	Appointed	Rotating	Rotating
Production technology	Line assembly	Line assembly	Line assembly	Line+dock assembly	Line	Short flow	Dock + line
Production lines	8-10	11	1	1+12 docks	Line	9	6 docks + 2 line
Production environment	Capital intensive	Capital intensive	Labour intensive	Capital intensive	Capital intensive	Labour intensive	Labour intensive

Table II. Comparison of plants and production environments

Skövde

Within the Skövde engine plant there are three distinct production environments: process, manufacturing and assembly. Each one has developed its own response to the changing environment. However, the issue is a little more complex than merely matching the structure of work organization to the demands of production. Although there are differences within the plant, the eventual aim is to consolidate a nucleus of common elements such as a rotating team leader and common competences with a series of additional elements linked to specific production environments.

Process environment – the foundry

Teamworking is unevenly applied in the foundry area. Much was made of this by the foundry director who continually stressed the significance of the process environment compared to manufacturing and assembly. This is partly to do with the capital intensive single flow process which utilizes a just-in-time (JIT) system. Maintenance workers have to be highly mobile so that they can be at a

systems breakdown point quickly when a problem occurs. Consequently, there is little maintenance skill contained within the operating teams. Nonetheless, a form of teamworking does exist within the foundry. Teams are linked to distinct process areas – melting, forming, cleaning, core making, heat treatment, etc. – with each of the areas having around 50 employees with one supervisor and are split into a number of what they call "semiautonomous work teams". Supervisors are totally responsible for the quality, maintenance, productivity and decision making, with little or no responsibility devolved to the operator. The units have no team leaders, nor do they meet in any form of quality circle, although they do have some job rotation within rather between phases.

Teamworking is also affected by the somewhat negative outlook of the foundry director:

> In my opinion, I have been in the business for so long time and we have been testing groups, independent groups – I hate it, I hate it and I hate it again. Every man in the foundry and on assembly needs a manager to ask. They can have private problems and you need to have a leader! All this talk about independent groups is bullshit, bullshit and again bullshit. We have tried so many times here and it has been a catastrophe every time[29].

Traditional forms of labour control are combined with paternalistic leadership – "a boss belongs to his people not to his boss … we run the foundry as though we own it ourselves". Familial rhetoric rather than one of empowerment and participatory democracy is used to generate loyalty and consent: "We are skiing together, we have parties together, we have fun here. I think we are a family" (foundry director).

Manufacturing environments

Here teamworking is linked to automated production in a multi-machine environment. The finished shafts and casings are transferred from the foundry to either the D factory where they are machined into crankshafts, transmission covers and camshafts or to the A factory where they are machined into cylinder heads and cylinder blocks. In both plants teams are organized around specific production lines and shifts with a philosophy of job rotation, payment is linked to the achievement of competences, providing a more cost effective production environment. The machinery needs to be running at optimum level, and with competence steps and skilled workers on a rotating basis this means that only a minimum number of operators is needed to keep the machines at that optimum. In a functionally flexible environment and with the machines running themselves, operators are released to perform indirect tasks associated with material supply, quality, housekeeping and task allocations within the teams. Operators are responsible for some control and programming functions, product quality, machine set ups and retooling – which reduces down time – the ordering of material as well as machine operations and also responsible for planning their own work. It is the team which is looking to define and make its own "continuous improvements" and it is the teams rather than managers which are responsible for solving quality problems.

In the D factory the area we studied consisted of a three-shift system with a supervisor responsible for 24 operators organized into three teams on a one-team-per-shift basis. The instructor – level K in the competence steps – is appointed on a permanent basis by the foreman and has responsibility for the organization of daily routines and forward planning issues.

However, even within similar production environments differences within the application of teamwork do occur. The A factory has a production hierarchy of production manager – supervisor – operator, with a rotating team leader. The operator we spoke to was fulfilling the role of team leader – a position rotated every eight weeks between those operators who have reached level K on the competence steps:

> We change group leader every four weeks, otherwise you would have a boss … The group leader acts to help out people with any problems they have, sort out material shortages, sort out problems with components coming from other parts of the factory or problems in the receiving plants in the factory.

Recruitment to this area was limited to those Volvo employees with at least three years service in similar production environments who had reached a high level of competence and were willing to undergo some form of team training. Every new employee is given a briefing about the system and asked if they want to work in such a system. This is compared to the earlier system in which:

> We had more or less pushed people into group working. Consequently, today we have a very interested and a very skilled work force in all systems … we do not need tough guys here any more, it is OK to have a brain (plant manager, A Factory).

Team training involves courses on effective group working, collective decision making, and basic mechanical and electrical skills, with the role of the supervisor as that of facilitator and in some cases that of line management with his teams taking routine task decisions. There has been a parallel change of attitude on the shopfloor since more women have been introduced into blue collar areas:

> It is better with women on the shopfloor, we behave better. When we sit down for our breaks it is a different type of atmosphere. We do not just talk about cars and engines. With girls we tend to go over other things. It is very important that you come away, when you go into the break, that you do not think about work, you maybe talk about your family (production operator).

Similarly, at the Köping axle plant the impetus for introducing teamworking was an investment in a multi-machine environment with a reduced workforce. Teams at Köping have no team leaders. This is seen as adding an extra layer of bureaucracy, with supervisors being responsible for five teams. They consist of six workers in each team who between them have the responsibility for controlling absenteeism, planning, material control and handling, overtime and task allocation in a rotational environment. Teamworking

> was not necessary before when there was one person to one machine. When you are working in a larger environment with several machines you have to work in a group and you need social skills (production manager).

Production and personnel managers see operators working in teams as better able to solve tasks such as routine maintenance, job planning, economic and quality analysis. The technical rationale of the project is clear in that the company claims the new organizational structure allows workers "to use more of the skill they have and we get a more efficient company", plus less maintenance and supervisory personnel.

However, some traditional elements do remain. Payment in the plant is based on an MTM system rather than the incremental competence system used elsewhere in VTC and although they claim to utilize competences, payment is structured around "what you do not, rather than what you do know". There is also a tension in the plant between older more traditional managers and the newer ones who support the team work philosophy, with the former wanting to retain the old piece rate system:

> The end of the piece rate system was not without its problems. You should have been here at the time we changed. We had a lot of struggles me and my boss whether to do it or not. Was it possible to manage a factory without a piece rate system? My answer was yes, my boss did not believe it. The answer is to involve more people in the process, to take care of the competence and the commitment that exists and has always existed in the company. We would also give all the people a chance to show what they can do (production manager, Köping).

Management claimed remarkable improvement in productivity. The explanation given is that this is due to changes in the payment system and in the organization of work. So although management acknowledges that the demands of the new system are higher and there is more stress, it is argued that people have responded positively to this and one of the indicators of stress levels – absenteeism, has actually decreased over the past two years from 14.6 to 11.9 per cent: "we can show that the sick leave problems connected to the working environment have decreased". It is not just that workers work harder – which of course they do – but the developments in work organization make the machinery more efficient with reductions in down time increasing machine tool efficiency from 40-90 per cent in some areas.

Assembly environment – engine assembly at Skövde

There are a number of production environments related to the different product families. We concentrate on the newly installed facility for the new "FH" range of trucks introduced in 1993/94. This area is interesting in that there is a dual production strategy in place with all common operations being carried out on an automatic flowline. At the end of the automated element in production the engines go into one of 12 docks in which the customized elements are added manually.

The flowline system is automated with manual loading and unloading at the start and end of the process and with units carried from machine to machine by roller system. Each unit is loaded onto the carrier system, which contains a computerized sensor which records information every time an operation is carried out. This is linked to a computer which sends a message to the stores, which then sends out material by automatic carriers to the relevant station.

The current structure of teamworking in this area is an ongoing response to developments in their business environment:

> Every step we took from 1974 (onwards) was the best for that day. In four or five years' time we will say we can do it better because we have the experience … it will not be the same as today I am sure (supervisor, FH assembly, F plant).

It shares, with the A and D plants, an employee profile requiring some experience of area production, an ability to carry out routine maintenance tasks, computer skills, and job rotation with seven to ten operators per team. Like the A plant it has a rotating team leader, and with the D plant it has an extra layer in the form of an instructor, which in some areas is fixed and rotates in others, depending how many in the team have the relevant competence for the position. The strategy is that as more operators move up the competence ladder, the team leader and instructor functions will rotate. Instructors have responsibility for managing daily routines, team co-ordination, multi-responsibilities for up to three teams, material supply, personnel issues, maintenance, quality and design changes.

The rotating structure also applies to blue collar operations. There is a loose, task rotating structure that is fluid enough to allow operators to wander around the system helping each other. Observing the area, we were struck by the inability of both the plant manager and area supervisor to identify which operator was doing what task:

> all the people are walking here, you never know who is the controller, who is the operator. In the old factory it was a case of this is my job and this is your job (FH assembly supervisor).

These developments parallel the appointment of a new young and less traditional manager in the F plant whose "ideas are more or less the same as ours" (union chairperson). As teamworking experiments develop the implication is that less and less direct forms of control are required, in part because no disciplinary action is allowed in the teams. Nonetheless, there are problems and contradictions in conceptualizing the needs of the system to have more management and the requirements of the new young cadre of managers to relinquish managerial control. These problems still have to be resolved.

Cab trimming at Umeå

The Umeå plant, situated in Northern Sweden near the Arctic circle, cuts, presses, assembles and paints cab parts. The area on which we are going to concentrate is the final process in the plant – that of the trimming area ready for delivery to the assembly plants in Sweden, Belgium and Scotland. Production now moves away from capital to labour intensive environments in which balance losses are more crucial due to the greater range of possible specifications and is based around a series short flows – a combination of flowline and dock technology. During our visits to the plant 16 short flows were operating with each flow consisting of four stations organized sequentially in a square formation. There are two operators per station with a

floating ninth person who also acts as team leader and operator replacement as and when required. The design of the short flow is linked to five competence steps at the level of task, quality, control and decision-making capabilities. The team leader role is equivocal. In theory the position is linked to competence organized on a meritocratic and open basis, but the position is appointed and not rotated.

The team leader continues to operate as a blue collar worker and to spend some of his time in helping to reduce the number of supervisors by having responsibility for the introduction and use of new short flows, deciding when to get rid of people and who to get rid of and to juggle labour shortages – in other words to carry some of the more mundane traditional supervisory functions. The overall aim of the short flows is to reduce balance losses across the range of products they make and this instrumental objective is the dominant rationale for change. However, this is not seen at the expense of good work, but as complementary to it. The plant manager observes that, "We cannot expect a guy to be a craftsman when he is doing the same job 15 or 20 times a day. If you expand the work it will give (the operator) value. I am not talking about trimming for two hours instead of 30 minutes, I am talking of adding more complicated work outside of trimming by expanding frontiers". Nevertheless, there are clearly costs to the employee. For example, by moving away from line production and increasing cycle times in a leaner framework, there is little extra cover for absences.

As with a previous example, management also want to see more women coming into blue-collar environments:

> We must have girls in the system. The first reason is that we have to have justice in the station; otherwise we deny 50 per cent of the population the right to work there. The other reason is that it gives you another climate. I have seen it already. Suddenly the guys shave in the morning, they have taken down the pin up pictures. Suddenly it is more friendly, it gives you another atmosphere (plant manager).

Final assembly of trucks at Tuve

Tuve is organized into two quite distinct production areas. High volume, standard production vehicles with low specification are assembled on one of two parallel flows. Low volume, high specification vehicles are assembled in one of six dock areas consisting of a two-phase production environment with cycle times of four hours.

Volvo Truck experimented between 1974 and 1977 with new production techniques in which 20 men assembled complete vehicles in a two-phase dock. High levels of managerial resistance meant that these experiments were short-lived. However, in the mid-1980s a group of production engineers who were concerned to reduce absenteeism, labour turnover, repair, rectification and lead time, and to solve the problem of balance losses, looked to find a concept that could both increase job satisfaction and a become a system more adaptable to customer demands' needs for low volume variants. The resulting dock

technology acts as a complement to the flowline for the assembly of those special and more complex vehicles which create balance losses in the flowline. To this extent the docks have been relatively successful in that they have reduced repair and adjustment time and improved quality, which has meant that the average assembly time per vehicle has been reduced from 80 hours in 1989 to 43 hours in 1994.

Job rotation frequency is decided within the teams and in theory people can rotate every four hours with rotation linked to the position the operator has in the eight-step competence ladder; however, specialist roles such as production leader and other "skilled" tasks do not usually rotate. Production leaders usually hand-pick the operatives for their respective docks. Essential requisites for recruitment into these areas are linked to health, loyalty "and the desire to be a good employee". It has also been stressed that operators should be able to work together. With the help of psychological profiling, management have also attempted to identify leadership potential. There has been little in the way of directed team training, with the company relying more on the internal developments in the team process rather than formal specification of behavioural requirements.

The stability of such initiatives may, once again, be affected by the values of the dominant managerial group. The main protagonist for the introduction of docks into the Tuve plant remains highly critical of the system. He sees it as bending too much to the needs of the customer, which leads to an inefficient way of producing trucks. In an ideal world he wants to see a return to flowline production and traditional Taylorist work organization.

Conclusion and evaluation of the case studies

Our research questions were concerned with managerial goals and substantive variations in the dimensions of teamworking. In this respect VTC manifests an inevitable tension within the spread of activities of a vertically integrated multinational. On the one hand there are corporate objectives for the redesign of work organization to meet the pressures of new markets, flexible technologies and production environments. Though different than the older Volvo experimentation with semi-autonomous groups and less ambitious than better known initiatives such as Udevalla, teamworking, along with other changes such as competence ladders, is seen as a necessary precondition for transforming the technical division of labour and becoming leaner in the process.

On the other hand, VTC represents a complex spatial and social structure of plants in different countries and different production environments. That creates an ongoing process of adaptation to or accommodation with the local environment, both within and between plants. When different power resources and predispositions of key actors are present there can never be a simple process of transfer of "best practice" within the production chain. It is worth keeping in mind that teamworking remains *a* means of achieving change. As our own research in Austria[30] demonstrates, if the utilization of skilled labour

can achieve the same flexibility and related objectives, teams may not need to be introduced.

As for the governance dimension, the plants we examined have a fairly uneven record on issues of delegation of powers and election of team leaders. Nevertheless, it was still a more positive picture than that provided by the more general evidence, where it is widely accepted that constraints on autonomy remain strong. As Murakami observes, "The conclusion may be, that while with teamwork more 'autonomy' is given to the shopfloor, this 'autonomy' remains closely monitored and controlled by the company itself"[21, p. 10]. Though there are "textbook cases" of high levels of autonomy, such as two US sites investigated by Cutcher-Gershenfeld *et al.*[3, pp. 49-51], most case studies, for example of the GM/Toyota NUMMI plant[10], and of Mazda in Flat Rock Michigan[31], confirm a more pessimistic conclusion.

Though Mueller[27] identifies the standard "roadblocks to change", such as supervisory and team member resistance, poor structure design, and lack of expertise in order to explain managerial reluctance to decentralize power, current dominant configurations of teamworking and wider production systems also frequently suffer from deep-rooted incompatibility between objectives pursued in the technical and governance spheres. As management researchers such as Klein[23] observe, lean production systems based on JIT, statistical process control and continuous improvement "inevitably means more and more strictures on a worker's time and action"[23, p. 62]. Using her own research into an engineering plant she shows how initial success in developing substantial self-management was gradually eroded as the push towards standardization and elimination of variations led to a loss of individual and team autonomy, as well as autonomy over methods. Though Klein believes that a scaled-down version of self-management is still feasible, her observations tie closely into radical critiques of teamworking as an extension of work intensification and management by stress[7,8,30].

There is little evidence from our cases of any strong drive by management to use teams as a means of normative regulation. One of the few explicit issues which was realized was the objective of changing the culture of the teams through altering the gender balance. This contrasts with other case studies[32,33], which give similar accounts of the way in which the internal culture of self-managing teams creates self-imprisoning units in which peer pressure is exerted against those who deviate from the normative rules. Rich though the above case studies are, their representativeness is less clear. Though there will always be cultural interventions through training and other processes in order to produce "team players", the rules of the game will differ decisively by context. For example, there is likely to be a major difference between companies with strong corporate cultures operating on foreign or greenfield sites, and a company such as Volvo with a history of collaborative industrial relations and work organization. Further research we have undertaken on VTC operations outside Sweden in Belgium and Scotland shows that it is primarily the absence

of such support mechanisms which has made teamworking much more difficult to introduce.

Though teamworking has emerged as a key factor in redesigning production, unless such practices interlock positively with support systems in spheres such as industrial relations and firm governance, incompatible objectives may undermine new initiatives and current managerial interest may prove to be as faddish as many of its predecessors. But to understand the variety of new developments we need the tools to analyse the different configurations of teamworking, with respect to both its dimensions and contexts, rather than treating it as part of an authentic, linear tradition, or undifferentiated package. Studies increasingly take note of variations and interorganizational learning, not only within countries, but between and within firms of the same national origin competing in a more global economy[20,27]. Our evidence from Volvo points to the salience of all these factors.

Notes and references

1. Womack, J.P., Roos, D. and Jones, D.T., *The Machine that Changed the World,* Rawson Associates, New York, NY, 1990.
2. Littler, C., *The Development of the Labour Process in Capitalist Societies,* Heinemann, London, 1982.
3. Cutcher-Gershenfeld, J. *et al.,* "Japanese team-based work systems in North America: explaining the diversity", *California Management Review,* Vol. 37 No. 1, 1994, pp. 42-64.
4. Safizadeh, M.H., "The case of workgroups in manufacturing organizations", *California Management Review,* Vol. 33 No. 4, 1994, pp. 61-81.
5. Wickens, P., "Steering the middle road to car production", *Personnel Management,* June 1983.
6. Adler, P. and Cole, R., "Designed for learning: a tale of two auto plants", in Sandberg, A. (Ed.), *Enriching Production,* Avebury, Aldershot, 1995.
7. Parker, M. and Slaughter, J., *Choosing Sides: Unions and the Team Concept,* Labor Notes, South End Press, Boston, MA, 1988.
8. Robertson, D., Rinehart, J. and Huxley, C., "Team concept: a case study of Japanese production management in a unionised Canadian auto plant", paper presented at the 10th International Labour Process Conference, Aston, 1992.
9. Altmann, N., "Japanese work policy: opportunity, challenge or threat?", in Sandberg, A. (Ed.), *Enriching Production,* Avebury, Aldershot, 1995.
10. Turner, L. and Auer, P., "A diversity of new work organization. Human-centred, lean, and in-between", *Industrielle Beziehungen,* jg. 1, Heft 1, Rainer Hampp Verlag, Mering, 1994.
11. Sandberg, A., "The Udevalla experience in perspective", in Sandberg, A. (Ed.), *Enriching Production,* Avebury, Aldershot, 1995.
12. Aeertson, F. and Benders, J., "Tricks and trucks: ten years of organizational renewal at Daf?", paper presented to 13th International Labour Process Conference, University of Central Lancashire, UK, 1995.
13. Jurgens, U., "Lean production in Japan – mythos and realität", in Hans-Bockler Stiftung *et al.* (Eds), *Lean Production – Schlanke Produktion,* Tagungsband, Dusseldorf, 1992.

14. Berggren, C., "The fate of the branch plants – performance versus power", in Sandberg, A. (Ed.), *Enriching Production,* Avebury, Aldershot, 1995.
15. Williams, K., Haslam, C. and Johal, S., "Fait accompli? A Machiavellian interpretation of the Renault-Volvo merger", in Sandberg, A. (Ed.), *Enriching Production,* Avebury, Aldershot, 1995.
16. Cole, R.E., *Strategies for Learning: Small Group Activities in American, Japanese and Swedish Industry,* University of California Press, Oxford, 1989.
17. Cohen, S.G. and Ledford, G.E., "The effectiveness of self-managing teams: a quasi-experiment", *Human Relations,* Vol. 47 No. 1, 1994, pp. 13-43.
18. Jurgens, U., "Group work and the reception of Uddevalla in the German car industry", in Sandberg, A. (Ed.), *Enriching Production,* Avebury, Aldershot, 1995.
19. Jenkins, A., "Teams: from ideology to analysis", *Organization Studies,* Vol. 15 No. 6, 1994, pp. 849-60.
20. Rehder, R.R., "Saturn, Uddevalla and the Japanese lean systems: paradoxical prototypes for the twenty-first century", *International Journal of Human Resource Management,* Vol. 5 No. 1, 1994, pp. 1-31.
21. Murakami, T., "Teamwork and trade union workplace representation in the German and British car industry", paper presented to 12th International Labour Process Conference, Aston, 1994.
22. Dawson, P., "Flexible workcells: teamwork and group technology on the shopfloor", paper presented to 9th International Labour Process Conference, UMIST, Manchester, 1991.
23. Klein, J., "The human cost of manufacturing reform", *Harvard Business Review,* March-April 1991, pp. 62-6.
24. Rothstein, L.R., "The empowerment effort that came undone", *Harvard Business Review,* January-February 1995, pp. 20-31.
25. Freyssenet, M., "The origins of teamwork at Renault", in Sandberg, A. (Ed.), *Enriching Production,* Avebury, Aldershot, 1995.
26. Itoh, E., "Labour control through small groups: Japanese labour today", *Radical America,* Vol. 18 Nos 2/3, 1984, pp. 27-39.
27. Mueller, F., "Teams between hierarchy and commitment: change strategies and the 'Internal Environment'", *Journal of Management Studies,* Vol. 31 No. 3, 1994, pp. 383-403.
28. Space precludes examination of the full range of plants. For an account of wider changes in VTC, including plants in Belgium and Scotland, see Thompson *et al.* in a forthcoming article. We are grateful to Roland Ahlstrand for some of the information on competence structures.
29. A more recent visit revealed that his views had become more supportive of teamworking, though there was still unease at the prospect of rotating team leaders. In addition a new production manager has been hired whose views are more in line with those involved in training and personnel functions.
30. Thompson, P., Wallace, T., Flecker, J. and Ahlstrand, R., "It ain't what you do, it's the way that you do it: production organization and skill utilisation in commercial vehicles", *Work, Employment and Society,* Vol. 9 No. 4, 1995, pp. 1-24.
31. Fucini, J. and Fucini, S., *Working for the Japanese: Inside Mazda's American Auto Plant,* Free Press, New York, NY, 1990.
32. Barker, J.R., "Tightening the iron cage: concertive control in self-managing teams", *Administrative Science Quarterly,* Vol. 38, 1993, pp. 408-37.
33. McKinlay, A. and Taylor, P., "Power, surveillance and resistance: inside the factory of the future", paper presented to 12th International Labour Process Conference, Aston, 1994.