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Participative work design in lean production

A strategy for dissolving the paradox between standardized work and team proactivity by stimulating team learning?

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Abstract

Purpose – The purpose of this paper is to explore job design mechanisms that enhance team proactivity within a lean production system where autonomy is uttermost restricted. We propose and test a model where the team learning process of building shared meaning of work mediates the relationship between team participative decision-making, inter team relations and team proactive behaviour.

Design/methodology/approach – The results are based on questionnaires to 417 employees within manufacturing industry (response rate 86 per cent) and managers' ratings of team proactivity. The research model was tested by mediation analysis on aggregated data (56 teams).

Findings – Team learning mediates the relationship between participative decision-making and inter team collaboration on team proactive behaviour. Input from stakeholders in the work flow and partaking in decisions about work, rather than autonomy in carrying out the work, enhance the teams' proactivity through learning processes.

Research limitations/implications – An investigation of the effects of different leadership styles and management policy on proactivity through team-learning processes might shed light on how leadership promotes proactivity, as results support the effects of team participative decision-making – reflecting management policy – on proactivity.

Practical implications – Lean production stresses continuous improvements for enhancing efficiency, and such processes rely on individuals and teams that are proactive. Participation in forming the standardization of work is linked to managerial style, which can be changed and developed also within a lean concept. Based on our experiences of implementing the results in the production plant, we discuss what it takes to create and manage participative processes and close collaboration between teams on the shop floor, and other stakeholders such as production support, based on a shared understanding of the work and work processes.

Social implications – Learning at the workplace is essential for long-term employability, and for job satisfaction and health. The lean concept is widely spread to both public bodies and enterprises, and it has been shown that it can be linked to increased stress and an increase in workload. Finding the

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potential for learning within lean production is essential for balancing the need of efficient production and employees' health and well-being at work.

Originality/value – Very few studies have investigated the paradox between lean and teamwork, yet many lean-inspired productions systems have teamwork as a pillar for enhancing effectiveness. A clear distinction between autonomy and participation contributes to the understanding of the links between job design, learning processes and team proactivity.

Keywords Leadership, Learning processes, Team learning, Working conditions, Process innovation

Paper type Research paper

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Introduction

Psychologists have studied team working from the perspectives of democratizing of work (Emery and Thorsrud, 1969) for decades, and have analysed well-being, effectiveness and proactivity of individuals working in teams (e.g. West, 2002), and the respective effects on the team and the company level. This line of research advocates meaningful and challenging work tasks, where employees can influence their work, and learn from each other through collective reflexivity. The autonomous teams in the Volvo car production during the 80s that together assembled a car from scratch attracted international attention, and studies showed that these teams made a difference both for the individual and the company. However, self-managing teams within industrial production are nowadays rare, and the self-managing teams at Volvo are long gone. Krafcik (1988) and Womack *et al.* (1990) demonstrated the superiority of the Toyota Production System (TPS) over Western automobile production concepts, and lean production has been introduced on broad front. Lean production is based on seemingly opposing principles of work design, particularly standardisation of work process, levelling the workload to be constant over time (heijunka), continuous flow, short work cycles and a pull system for being "just in time", and employee involvement in continuous product and process improvements by team work and joint efforts of different functions and organizational levels (Monden, 1994). In an extensive comparison of 30 multi-national companies' production systems, Netland (2013) showed that the Volvo Production System (VPS) is heavily influenced by TPS, and that global companies largely choose the same production concept' principles in line with those mentioned above. VPS integrates these principles into six; the Volvo way, team work, process stability, built-in-quality, continuous improvements and just in time, and is geared towards meeting the demand of the customer.

Often lean production systems include team working as a pillar for continuous operational development and employee involvement. Continuous improvement relies on teams that are proactive, go beyond the stipulated work tasks and take the initiative to change. The job design limits autonomy and, according to theories of work motivation, should reduce employee work motivation, innovativeness and well-being. How can the paradox between standardized work and innovative teamwork be dissolved?

In this paper we will try to contribute to research by resolving these seemingly conflicting issues theoretically and empirically. For that purpose we draw on the concepts of team participative decision-making, inter team relations, team learning and proactivity and develop a model that perceives team learning as a crucial meditational process linking team participative decision-making and inter team relations with team proactivity. In the following, we will first describe, why we assume that team

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participation influences team proactivity, and why we assume the same for inter team relations. Then we will argue that team participation and inter team relations also influence team learning, and that team learning promotes team proactivity. Finally, we will reason that team learning serves as a crucial meditational process linking team participative decision-making and inter team relations with team proactivity.

Team participation and proactivity

Participation is defined as:

> The totality of forms […] and of intensities […] by which individuals, groups, collectives secure their interests or contribute to the choice process through self-determined choices among possible actions during the decision process (Wilpert, 1998, p. 42).

Whereas autonomy focuses on freedom in (a) work scheduling, (b) decision-making and (c) work methods (Morgeson and Humphrey, 2006). The concepts are somewhat blurred within team research, as influence characterizes both, but there is a clear distinction between being part of a decision-making process and the concept of freedom in carrying out the work independently. This splitting hair is important for creating learning processes in work where there is none or very little autonomy in the production work.

The link between autonomy and proactivity is well established (Frese *et al.*, 2007; West *et al.*, 2004). However, autonomy may only be beneficial if work demands are uncertain and dynamic and not if teams perform tasks that are clearly understood and optimized (Stewart, 2006). We propose that within standardized work in industry, participation in the planning phase of the work procedures, i.e. the standardization process, rather than autonomy in performing work tasks, is a key prerequisite for team learning processes and team proactivity.

Morgeson *et al.* (2005) showed that being part of job-related decisions positively impacts also the individual's role breadth and predicts behaviour that extends beyond formal job requirements. The constructs of taking charge, personal initiative and role breadth self-efficacy all capture an individual's propensity to engage in proactive behaviour: challenging the status quo and taking initiative in improving current circumstances or creating new ones rather than passively adapting to present conditions (Crant, 2000). West (2002) argues that there are two main reasons for why a link between participation in decision-making and team innovation exists; first, the influence over decisions will enhance exchange of information and of ideas, and secondly, there will be less resistance to change, as people invest in the outcomes of those decisions. Previous research has shown that all aspects of sequential completeness (being involved in planning, execution, controlling and getting feed back) have an impact on team proactivity (Lantz, 2011). A team, autonomous or not, can be partaking in the decisions during the planning phase and influencing both what should be done and how. The plan can include activities to initiate change and the more detailed the plan, the more likely it is to be manifested in innovation (West, 2002). In line with this reasoning, we *H1a* that there is a positive relationship between team participation in planning work procedures and proactivity in teams with little or no autonomy.

Inter team relations and proactivity

A team is embedded in a broader system context that defines and drives team tasks demands. West (2002) concludes that high external demands have a significant impact on individual, team and organisational innovation. Substantial research has shown that

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information sharing, high level of interactions, feedback and cross-fertilisation of perspectives within teams can spawn proactive behaviour and innovation, as these processes help the team to challenge the status quo (West *et al.*, 2004).

Previous research (Edmondson, 2002; Hirst and Mann, 2004) give evidence that different aspects of communication and collaboration also across borders affect performance and innovation. Decuyper *et al.* (2010) conclude that boundary crossing increases both efficiency and innovation, as participation in external meetings, networking, knowledge sharing, communication with stakeholders and other teams give input to team learning. *H1b* is that there is a positive relationship between inter team relations and proactivity in teams with little or no autonomy.

Team participation and building shared meaning of work

Team proactivity presupposes a shared understanding of the need for initiating change. The process of building a shared meaning from different individual perspectives is a team learning process (Savelsbergh *et al.*, 2009). In line with the current literature (Kozlowski and Chao, 2012; Oertel and Antoni, 2014), we perceive team learning as a multilevel process, characterized by different interaction patters of team members that leads to knowledge compilation on the team level. We define team learning following Van der Vegt and Bunderson (2005, p. 534) as: "activities by which team members seek to acquire, share, refine, or combine task-relevant knowledge through interaction with one another". Team learning is thus by definition something that is collective, and is the result of the individual's cognitive processes and the interactions among team members (Billet, 2008). In this study, we focus on the process of building (co-constructing) a shared meaning from different individual perspectives, as a recent study showed that co-construction helps teams to build shared mental models and to improve their effectiveness (Van den Bossche *et al.*, 2011).

Extensive research has suggested that autonomy enhances reflective and innovative team climate and learning processes in teams (Antoni, 2005; Edmondson, 2002; West *et al.*, 2004). Taking decisions about work-related issues will put demand on reflexivity as different alternatives are compared, and the team has to reach a shared meaning in order to form a plan for what should be done. The planning phase of preparation and team mission analysis relies on, and give input to, the collective interpretation of the team's purpose, identification of main tasks, conditions and resources for the work (Savelsbergh *et al.*, 2009). *H2a* postulates that team participation in planning work procedures is positively related to the process of building a shared meaning of work in teams with little or no autonomy.

Inter team relationships and building shared meaning of work

Learning from what others do and getting and giving feedback on work-related issues can give input to forming a shared meaning of work, conditions for work and expected outcomes. In a literature review on team learning, Decuyper *et al.* (2010) identify boundary crossing as one part of, and essential for, team learning. This might be especially helpful for teams with habitual routines in standardized routine task situations, as information from outside can provide an impetus for change and can increase the diversity of perspectives (Gersick and Hackman, 1990). However, learning from other teams requires that team members use and elaborate the information they get and do not devaluate it due to in-group and out-group categorization processes, as they

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are likely to occur in conflicts (Van Knippenberg *et al.*, 2004; Hoever *et al.*, 2012). As other teams and functions are stakeholders in the team's learning process in a work flow, we assume that good inter team relationships can foster team learning processes. Therefore, *H2b* postulates that good inter team relationships are positively related to the process of building shared meaning of work in teams with little or no autonomy.

Building shared meaning and proactivity

Team-learning behaviours enhance performance, as they help teams to build shared mental models regarding their task and its context (Van den Bossche *et al.*, 2011). In order for a team to form a revised strategy for action there has to be some consensus about what needs to be done and why. The reconstruction process of work allows the team to define extra-role goals and actions that are proactive (Frese *et al.*, 2007). Team learning behaviours have consistently shown strong and positive relationships with performance (e.g. Edmondson, 2002), adaptability and performance (Hahn and Williams, 2008), proactive behaviour and innovation (Savelsbergh *et al.*, 2009; West *et al.*, 2004). *H3* postulates that there is a positive relationship between building shared meaning of work and proactive behaviour in teams with little or no autonomy.

The research model

The aim of the study is to explore job design mechanisms that enhance team proactivity within a lean production system where autonomy is uttermost restricted. Based on *H1* to *H3*, we assume that building shared meaning mediates the relation between participation, inter team relationship and team proactivity. Being part of work-related decision-making and getting input from others will help the team to build a shared meaning of demands, goals, strategies and work routines (Van den Bossche *et al.*, 2011; Decuyper *et al.*, 2010). In order to challenge the status quo and go beyond the stipulated task, the team members need a shared meaning of what to do and why. Team learning, particularly building shared meaning, will therefore promote team proactivity (Savelsbergh *et al.*, 2009; West *et al.*, 2004). As we also assume that team participative decision-making and good inter team relations enhance team proactivity (Edmondson, 2002; West, 2002), we do not only expect an indirect but a mediation effect via team learning, which requires such a relationship between predictor and dependent variables (Baron and Kenney, 1986; Hayes, 2013). Consequently, *H4* proposes that building shared meaning mediates the relationship between team participative decision-making (*H4a*), inter team relations (*H4b*) and team proactive behaviour.

Methods

The results are based on a study conducted within the production of a Swedish manufacturing enterprise within the Volvo group. The production was divided into 17 departments and 56 shift teams supervised by 17 production managers. The production was designed according to the principles of the Volvo Production System (VPS). Netland (2013) concluded that VPS is based on the 10 main principles of lean production: standardized work, Kaizen, quality programs, pull system, flow orientation, focus on value stream, employee involvement, visualization, customer focus, stability and robustness, workplace management and just-in-time. Standardization of work was seen as the foundation for continuous improvement. The teams were collectively responsible for the production work and extra-role work tasks as maintenance work

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problem-solving to eliminate deviations, and implementing change- and developmental activities.

Procedure

The project was presented on a general meeting for all employees within the production. The questionnaires had a missive giving information about the study and ethical issues, and participation was voluntary. The questionnaires were coded in order to ensure confidentiality.

Participants

All employees in the production (491 employees, 3 per cent women) were invited to participate in the study. A large majority (422 persons out of 491, 86 per cent) participated. Seven respondents were excluded due to incomplete responses. The remaining 417 individuals worked in 57 teams, and one team was excluded, as it only consisted of two team members.

Scales

All items were answered on a five-point Likert scale ranging from 1 (do not agree) to five (agree completely). All scales had an acceptable internal consistency (Cronbach's alpha), where $0.71 \leq \alpha \leq 0.90$.

Team participative decision-making was measured by three items adapted from Campion, Medsker and Higgs (1993), e.g. "The members of my team can influence the methods, procedures, and schedules with which the work gets done." ($\alpha = 0.71$).

Inter team relations was measured with five items adapted from the ATPI (West), e.g. "We work closely with other teams and departments in the organisation (e.g. with the team-plan)." ($\alpha = 0.78$).

Building shared meaning was measured by six items adapted from Savelsbergh *et al.* (2009), e.g. "Team members elaborate on each other's information and ideas." ($\alpha = 0.90$).

Team self-rated proactive behaviour was measured by eight items adapted from Morrison and Phelps (1999), e.g. "In my shift-team we often have ideas of new work methods that are more effective." ($\alpha = 0.83$).

Additionally proactive behaviour of each team was rated by the respective manager, using the above scale for team self-rated proactive behaviour, but adapted to capture each and every team, e.g. "Shift-team X often has ideas of new work methods that are more effective." ($\alpha = 0.84$).

Potential control variables: Team proactivity might be positively related to team size (more team members might produce more ideas) and negatively to team tenure (the longer ones stays in the same team the fewer improvement ideas one might have). Likewise, building shared meaning might be negatively related to team size and positively to team tenure, as increasing team size might make it more difficult to build a shared meaning in the team, whereas longer team tenure might make it easier. Therefore, we assessed both team size and team tenure as potential control variables.

To examine if the multi-item measures represent distinct constructs, we analysed a four-factor model with all items loading only on their intended factors. The latent factors were allowed to correlate. The model fit was $\chi^2 = 676.73$, df = 203, $p < 0.000$, RMSEA = 0.075 (CI = 0.069 – 0.081), CFI = 0.88, NNFI = 0.86, SRMR = 0.08. Regarding all fit indicators, the fit can be considered as between acceptable and only slightly below acceptable (Schumacker and Lomax, 2004). All items of the predictor, moderator and

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dependent variable loaded significantly on their respective latent factors (factor loadings ranged from 0.34 to 0.84, with critical ratios ranging from 6.01 to 16.44, indicating highly significant loadings). The fit is better compared to three-factor model, with the items of the two predictor variables loading on a single factor (χ^2 = 941.12, df = 206, $p < 0.000$, RMSEA = 0.093 (CI = 0.087 – 0.099), CFI = 0.81, NNFI = 0.78, SRMR = 0.10; $\Delta\chi^2$ = 264.39, Δdf = 3, $p < 0.000$), as well as compared to a two-factor model, with the items of the two predictor variables and the mediator variable loading on a single factor (χ^2 = 1,321.61, df = 208, $p < 0.000$, RMSEA = 0.113 (CI = 0.108 – 0.119), CFI = 0.71, NNFI = 68, SRMR = 0.10), as well as a one-factor model (χ^2 = 1,644.43, df = 209, $p < 0.000$, RMSEA = 0.128 (CI = 0.123 – 0.134), CFI = 0.63, NNFI = 59, SRMR = 0.10).

As data were analysed on team level, we examined whether aggregation was appropriate and calculated $r_{wg,j}$ coefficients for inter-rater agreement within groups (James *et al.*, 1984). The $r_{wg,j}$ medianvalues for team participative decision-making, inter team relations, building shared meaning and proactive behaviour were 0.83, 0.85, 0.91 and 0.93, respectively, justifying team level aggregation (James *et al.*, 1984).

Because teams were nested within production cells, a hierarchical data structure exists, suggesting multilevel analysis. We tested if both self-rated proactivity and production leader-rated proactivity differed between the production cells using ANOVAs. Additionally, we calculated random intercept models including the main predictors as fixed effects and compared them with ordinary least squared models using Chi-Square Difference Tests. Both ANOVAs and the Chi-Square Difference Tests showed non-significant results, indicating that multilevel analysis were not required. We therefore decided to use correlation and hierarchical regression analysis to test our hypotheses.

Results

Scale means, standard deviations and inter-correlations on team level are reported in Table I. All scale inter-correlations were in line with our hypotheses that team participative decision and inter team relations are positively related with team proactivity (*H1a* and *H1b*) and building shared meaning (*H2a* and *H2b*), as well as that building shared meaning is positively related with team proactivity (*H3*). Team participative decision-making correlates positively with self-rated ($r = 0.53$, $p < 0.001$) and manager-rated team proactivity ($r = 0.42$, $p < 0.01$) and building shared meaning ($r = 0.46$, $p < 0.001$), supporting *H1a* and *H2a*. Similarly, inter team relations correlate

Variables	*M*	SD	1	2	3	4	5	6	7
1 Teamsize	7.45	3.98							
2 Team tenure	13.67	5.82	−0.12						
3 Team participative decision-making	3.50	0.38	0.08	−0.13					
4 Inter-team relations	3.10	0.36	−0.02	0.07	0.19				
5 Building shared meaning	3.61	0.45	−0.09	0.01	0.46***	0.35**			
6 Proactive behaviour (self)	3.46	0.28	0.09	−0.05	0.53***	0.37**	0.66***		
7 Proactive behaviour	2.57	0.91	0.20	−0.09	0.42**	0.24†	0.27*	0.36**	

Notes: ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$; $^{\dagger}p < 0.10$ (two-tailed); $N = 56$

Table I.
Descriptive statistics, inter-correlations on team level

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positively with self-rated ($r = 0.37$, $p < 0.01$) and manager-rated team proactivity ($r = 0.24$, $p < 0.05$ one-sided) and building shared meaning ($r = 0.35$, $p < 0.01$) supporting *H1b* and *H2b*. Also building shared meaning correlates positively with self-rated ($r = 0.66$, $p < 0.001$) and manager-rated team proactivity ($r = 0.27$, $p < 0.05$), supporting hypotheses *H3*. As team size and team tenure did not correlate significantly with team proactivity and building shared meaning, we did not consider them as control variables in the following regression and hierarchical regression analyses to avoid loss in test power.

To further test *H1* and *H2* that team participative decision making and inter team relations are related to team proactive behavior and building shared meaning, we regressed team proactivity and building shared meaning on both variables simultaneously (see Table II). Results showed that both team participative decision-making ($\beta = 0.47$; $p < 0.001$) and inter team relations ($\beta = 0.28$; $p < 0.05$) predicted team self-rated proactivity significantly, explaining 33 per cent of the adjusted variance [F (2; 53) =14.40; $p < 0.001$] and supporting *H1a* and *H1b*. With respect to manager-rated team proactivity only team participative decision-making ($\beta = 0.39$; $p < 0.01$) turned out as a significant predictor, whereas inter team relations ($\beta = 0.17$; n. s.) showed no independent effect, supporting only *H1a*.

H2a and *H2b* propose that team participative decision-making and inter team relations are related to team learning, i.e. building shared meaning. Both team participative decision-making ($\beta = 0.41$; $p < 0.001$) and inter team relations ($\beta = 0.27$; $p < 0.05$) showed significant and independent effects explaining in total 25 per cent of the adjusted variance of building shared meaning [F (2; 53) = 10.32; $p < 0.001$].

H4a and *H4b* propose that team learning, i. e. building shared meaning, mediates the relationship between team participative decision-making, inter team relations and team proactive behaviour (cf. Figure 1). We tested these two hypothesis using hierarchical regression analyses and the process macro (2.04) by Hayes (2013). This procedure allows to assess the proposed mediation effect (ab-path) directly using both bootstrapping and normal theory tests, and to assess the effect sizes of the mediation effect and is therefore preferred to the approach described by Baron and Kenney (1986).

In line with *H4a*, bootstrap analysis with a sample size of 10,000 (Preacher and Hayes, 2004) supported a mediation effect of team participative decision-making on team self-rated proactivity via building shared meaning (B = 0.18; SE = 0.07; 95 per cent CI [0.06, 0.33]; z = 2.94, $p < 0.01$), accounting for 46 per cent of the total effect (SE = 0.19; 95 per cent CI [0.19, 0.98]). Kappa-square, i. e. the proportion of the indirect effect to the

Table II.
Multiple regression analysis regressing self-rated and manager-rated proactive behavior, and building shared meaning on team participative decision-making and inter-team relations

Predictors	Self-rated proactive behavior	Manager-rated behavior	Building shared meaning
Team participative decision-making	0.47***	0.39**	0.41***
Inter-team relations	0.28*	0.17	0.27*
R^2	0.35	0.20	0.28
Adjusted R^2	0.33	0.17	0.25
F	14.40***	6.65**	10.32***

Notes: ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$ (two-tailed); $N = 56$; coefficients are standardized regression coefficients

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maximum possible indirect effect that could have occurred, indicates a medium effect size (Kappa-square = 0.26; SE = 0.08; 95 per cent CI [0.09, 0.42]), according to Cohens' (1988) guidelines. Bootstrapping analysis also supports a direct effect of team participative decision-making on team self-rated proactivity (B = 0.21; SE=0.08; 95 per cent CI [0.05, 0.37]).

A mediation effect was also supported for inter team relations (B = 0.16; SE = 0.06; 95 per cent CI [0.04, 0.30]; $z = 2.40$, $p < 0.05$), accounting for 56 per cent of the total effect (SE = 4.97; 95 per cent CI [0.21, 1.36]). Kappa-square, indicates a medium effect size (Kappa-square = 0.22; SE = 0.08; 95 per cent CI [0.06, 0.37]). Bootstrapping analysis also indicates that there is no direct effect of inter team relations on team self-rated proactivity, as zero was within the 95 per cent confidence interval (95 per cent CI [−0.04, 0.30]).

As only team participative decision-making and not inter team relations predicted production leader-rated team proactivity independently, we tested the proposed mediation of building shared meaning only for this variable. Bootstrap analysis supported no indirect effect of team participative decision-making on production leader-rated team proactivity, as zero was within the 95 per cent confidence interval (95 per cent CI [−0.06, 0.20]).

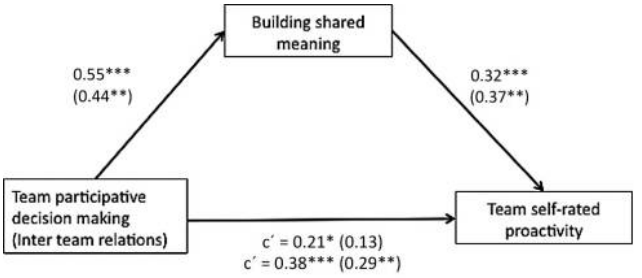
Discussion

Our interest lies in finding the potential in job design for team learning and team proactive behaviour, and in a context where those job design practises that previous research has shown are crucial for such processes do not exist. Lean-based production systems rely primarily on two processes:

(1) Eliminating non-value adding activities through standardization of work.

(2) Continuous operational development through proactive individuals and teams for increasing efficiency.

How, then, can the paradox between standardized work and innovative teamwork be dissolved? We proposed that in lean work structures with little or no autonomy participation in the decisions regarding work procedures stimulate teams to build a shared meaning of a team-mission that involve proactively improving the status quo.



Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, †$p < 0.10$ (two-tailed); $N = 56$; c' = direct effect; c = total effect ; shown are unstandardized regression coefficients

Figure 1. Indirect effects of team participative decision-making and inter team relations on team proactivity via building shared meaning

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Based on the mediation analysis of cross-sectional team level data of employees in a Volvo manufacturing plant, the research model got substantial, but not full, support. Team learning mediates the relationship between team participative decision-making and inter team collaboration on self-rated team proactive behaviour. Input from stakeholders in the work flow and partaking in decisions about work, despite the lack of autonomy in carrying out the work, enhance the teams' proactivity through learning processes.

Extensive research on team learning and innovative teams (West *et al.*, 2004) show that both autonomy and complexity are key job design parameters for vibrant team working. However, Rousseau and Aubé (2010) showed that task routineness is not a moderator of the relationship between team self-regulating behaviors and team process improvement, while it is for team performance and viability. Stewart (2006) advocated that autonomy is important for handling tasks when conditions are uncertain and dynamic. Frese *et al.* (2007) regard autonomy as trivial in jobs with little complexity as decisions then refer to unimportant issues. Within a lean-based production system the context in which work is carried out is not uncertain, and there are standardized procedures also for handling the deviations and the unexpected incidents that occur. Therefore, partaking in decisions about work procedures and goals as well as input from stakeholders in the work flow might be crucial for team learning and proactivity in this context.

Autonomy, job complexity and participation are related concepts, as all refer to decision latitude, and we take interest in where in the regulation process the decision-making is beneficial for team proactivity when work procedures are standardized. The result supports our idea that team participative decision-making in planning work design and work procedures as well as in setting goals is important for proactivity (*H1a*) and team learning (*H2a*) and that team learning (*H3*) is related to proactivity and mediates the relationship between team participative decision-making and proactivity (*H4a*). Future research will tell if team participative decision-making is of equal importance as job complexity and autonomy in task performance. We propose that team participative decision-making might stimulate the development of shared meaning of work more than task autonomy in the execution phase, as it requires a discussion among team members to come up with joint decisions, while degrees in freedoms in carrying out the work can be handled without words as part of a shared understanding of "this is how we do it" at least in routine and standardized tasks. Future research will shed light on this. Regardless of this, our results indicate that it is meaningful in future research to be aware of the fine lines between participation and autonomy.

Future research might also address besides team participative decision-making the influence of the respective leadership behavior. Wilpert, 1998 argue that participative leadership helps to execute a given job, while transformational leaders motivate workers to perform beyond expectations and focus on change and improvement through intellectual stimulation. An investigation of the effects of different leadership styles and management policy on proactivity through team-learning processes might shed light on how leadership promotes proactivity, as results support the effects of team participative decision-making – reflecting management policy – on proactivity.

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In line with our hypotheses good collaboration with other teams and departments in the work flow was significantly associated with team's self-reported initiative to change (*H1b*) and with building a shared meaning of work (*H2a*) that explained incremental variance beyond the effect of participation in decision-making. This is fully in line with previous research (Decuyper *et al.*, 2010) as learning, proactivity and effectiveness is stimulated by an outward focus. Furthermore, our results extend these findings, as they provide support that building a shared meaning of work mediates the relationship between collaboration with other units and self-reported initiative to change (*H4a*). Although neither a direct independent effect (*H1b*) nor an indirect effect (*H4b*) was supported for manager-rated proactivity, the observed relationship between collaboration with other units, proactivity (*H1b*) and building shared meaning (*H2b*) provides at least partial support for our assumptions.

A cross-sectional study has its obvious limitations, as cause–effect relationships cannot be inferred. To check for potential common method bias, we compared alternative factor models showing that the a priori four-factor model showed a significantly better fit than alternative three-, two- or one-factor models. Furthermore, we used an external measure of team proactivity as a complement to self-ratings. The model fit is naturally better when team proactivity is based on self-ratings (one-measurement errors), but external ratings and self-ratings are correlated, and the links between main variables are very similar when the two measures are compared.

Results of this study indicate that the paradox between standardized work and innovative teamwork can be dissolved by team participation in the decisions regarding work design and inter team collaboration, which foster team communication to clarify and develop a shared understanding of team goals and strategies and stimulate via these team learning processes team proactive behaviour. Within industry the support functions are important stakeholders in the process of standardization and process improvements. Reducing non-value-adding activities through the standardization of work is an on-going, participative and collaborative process of improvements between teams and support functions and not an implementation of a fixed standard developed by one expert party. Team participation and collaboration with support functions is important not only for performance, but for creating learning processes that over time are essential for individuals' and teams' work-related attitudes, behaviours and involvement in the continuous process of enhancing efficiency. This implies that the teams' proactivity depend on how proactive the support functions are, and how willing they are in investing in building relations with teams on the shop floor. What does it take to create and manage participative processes and close collaboration between teams and other stakeholders based on a shared understanding of the work and work processes? Based on our experiences of implementing the results in the production plant, we have a few messages to managers:

- A first message to managers within lean-based organizations is that it is an important task to identify all those who need to be involved in the process of standardization and improvements, and create acceptance, routines and platforms for participative decision-making.

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- A second message is that managers need to facilitate the participative decision-making process, and the building of a shared meaning of the motives for collaboration, how it should take place and what it is about. This is easier said than done, as it might involve challenging hierarchical structures, and teams' and support functions' conceptions of what work on the shop floor is about, and have impact on teams' as well as support functions' habitual ways of working. Lean production is not only about the production. Further, it puts demand on managers' knowledge of, and skill in team and inter team collaboration facilitation.
- Thirdly, all managers (of both production and support) need themselves have an agreement based on how and when to collaborate to facilitate the collaboration and participative decision-making process between all stakeholders in the production process. Such an agreement is an essential strategic decision for enhancing continuous operational development and employee involvement.

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