Team processes, their antecedents and consequences: Implications for different types of teamwork

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Although input–process–output models of teamwork are quite popular, relatively few studies have tested empirically the mediation of team design and team context variables on team effectiveness by team process variables. This review briefly describes mediation effects of team process variables. Moreover, moderating effects of different team tasks and types of teamwork are summarized. Based on this framework, we introduce and compare the four articles included in this special issue which provide examples of process-oriented studies in different types of teamwork. In doing so, these studies not only illustrate the variety of potential team process variables (e.g., communication between team members, team reflexivity and self-regulation, self-leadership of team members) but also different methodological strategies to explore them.

Keywords: Team effectiveness; Team processes; Team reflexivity; Task structure; Self-regulation.

Groups and teamwork are quite popular in and between work organizations today, and have attracted a lot of research from various disciplines (the terms “team” and “group” are used interchangeably in this article). In addition to many journal articles and book chapters, special issues on teamwork have been published in various journals, such as Human Relations (Vol. 53, No. 11, 2000), New Technology, Work and Employment (Vol. 16, No. 3, 2001), Personnel Review (Vol. 31, No. 3, 2002), International Journal of Operations and Production Management (Vol. 24, No. 8, 2004), and, International Journal of Human Resource Management (Vol. 16, No. 2, 2005). So, why “just another” special issue on teams?

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According to our perception, the predominant amount of existing group research has focused on the detection or verification of specific predictors of successful teamwork without demonstrating the mediating mechanism how and why these predictors have the effects they have. However, we need to know more about the psychological mechanisms of group work in order to explain and predict why certain groups are working successfully while others don’t.

Consequently, the objective of the present special issue is to contribute to a process orientation in group research that seems to have been somewhat forgotten since the early studies on group dynamics by Kurt Lewin and his colleagues. Even though processes are included in the prominent Input–Process–Output (I-P-O) frameworks of group research (e.g., Hackman & Morris, 1975; Ilgen, Hollenbeck, Johnson, & Jundt, 2005; Kozlowski & Bell, 2003; McGrath, 1964), concrete examples of research studies that demonstrate team processes as mediators empirically are rather rare (see, for examples, Curral, Forrester, Dawson, & West, 2001; Hertel, Konradt, & Orlikowski, 2004; Porter, 2005). In fact, typical team process variables such as communication and cooperation are often considered as predictor variables (e.g., Campion, Papper, & Medsker, 1996; Cohen, Ledford, & Spreitzer, 1996; Hyatt & Ruddy, 1997). Given the recent development of more sophisticated statistical tools such as mediation and multilevel analyses (e.g., Kozlowski & Klein, 2000; Strout & Bolger, 2002), numerous new opportunities and research questions arise in this field. The current issue provides four examples of process-oriented studies, illustrating not only the variety of different team processes (e.g., communication between team members, team reflexivity and self-regulation, or self-leadership of team members) but also different methodological strategies to explore them.

The first article of this issue, written by Brav, Anderson, and Lantz, analyses the intervening role of group processes, particularly of team reflexivity, between team task characteristics on the one hand and group initiative and self-organization on the other hand in production teams. The second article, authored by Kauffeld and Meyers, reports the exploration of interaction patterns in team discussions of production teams and how they can be changed. The third contribution, authored by Gevers, van Eerde, and Rutte, analyses how project teams regulate themselves to meet project deadlines. Finally, the fourth article, authored by Konradt, Andreßen, and Ellwart, analyses how self-leadership influences individual performance in service teams and how team characteristics moderate these relationships.

On the following pages, we give a brief review of recent findings on team processes as a framework for this special issue, including determining factors and consequences for different types of team tasks and types of teamwork. Moreover, we briefly introduce and compare the four articles included in this special issue, each providing answers to the questions raised earlier, and posing new ones.
TEAM EFFECTIVENESS FRAMEWORK

Team effectiveness in organizations is perceived as having at least two dimensions: team performance and team viability (Hackman, 1987; Sundstrom, DeMeuse, & Futrell, 1990). Team performance refers to the degree that team output meets or exceeds the performance standards given by supervisors or customers within or outside the organization. Measuring team performance according to the expectations of customers or stakeholders also implies the relation between team and organizational performance. Team viability refers to the degree whether team processes maintain or enhance the capability and willingness of team members to continue their collaboration, and whether team experiences satisfy members’ needs.

There is no doubt that the effectiveness of organizational teams depends on much more variables than can be conceptually or empirically analysed at a time, thus, it is not surprising that existing models of team effectiveness focus on different variables as important input or process determinants of team effectiveness (see Guzzo & Shea, 1992, for a comparison). However, despite this variation and further controversies regarding whether constructs are to be considered as input or as process factor, there is considerable agreement on major input and process variables particularly if they can be addressed by team interventions in order to improve team effectiveness (cf. Figure 1).

Figure 1. An heuristic framework of team effectiveness.
Among the most prominent input variables for team processes and team effectiveness are aspects of the team design, such as task structure, group norms, and group composition, and aspects of the organizational context of teams, such as rewards and incentives, training, information systems, as well as leadership or management control itself (Cohen & Bailey, 1997; Gladstein, 1984; Hackman, 1987; Tannenbaum, Beard, & Salas, 1992; West, Borril, & Unsworth, 1998). These aspects can be participatively designed or changed by management, for instance as a function of organizational strategy and culture, intergroup relations, the availability of resources, environmental demands, and of course as part of learning processes.

Empirical research exploring these input factors usually relies on team members’ assessments (e.g., Gladstein, 1984; Stewart & Barrick, 2000), which can be infected by various method biases (e.g., Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Measuring team input constructs independently from team members’ perceptions (and also independent from team processes; see Brav and her colleagues in this issue for an example) avoids such biases and increases the reliability of implications for practical interventions based on these factors.

Among potential group processes, team communication, within-team cooperation, and intrateam conflict are important elements of team interaction. Closely related to team interaction, and also mediating the effects of group design and group context on team performance, are the amount of effort and the coordination of effort that members apply to a task, together with the use and development of task performance strategies and of members’ knowledge and skills (e.g., Hackman, 1987). Similarly, team reflexivity, team climate, group cohesion, group potency and efficacy, shared mental models, and group emotional tone have been proposed as both mediating and process variables (West et al., 1998).

Some authors have described these latter concepts as closely related, but distinct from team processes. For example, Cohen and Bailey (1997) perceive these concepts as stable group psychological traits, Marks, Mathieu, and Zaccaro (2001) as more dynamic and varying emergent cognitive and affective states. Both group psychological traits and emergent states are defined as shared understandings, attitudes or motivations, which are both inputs and proximal outcomes of team processes in a series of I-P-O cycles. Marks et al. (p. 358) stress that “emergent states are not processes in and of themselves, because they do not describe the nature of member interaction”. This argument can be questioned as team reflexivity, for example, describes shared perceptions of specific behaviour patterns of team members. Similarly, scales measuring team climate for innovation, group cohesion, or group potency also address team interaction or task behaviour patterns. As these concepts reflect at least in part perceived
interaction processes and are closely interrelated with them, we subsume both team interaction processes and emergent cognitive and affective states under team processes.

Furthermore, we do not differentiate between team processes and team taskwork as two aspects of team interaction, as suggested by Marks et al. (2001). The latter define team processes as team members’ interdependent cognitive, verbal, and behavioural activities directed toward organizing task work within a team in order to achieve collective goals. Task work, on the other hand, is defined as “a team’s interaction with tasks, tools, machines and systems” (Marks et al., 2001, p. 357). It might be conceptually useful to restrict the definition of team processes to team members’ regulatory activities of their task-related interaction. However, in applied settings it is difficult to distinguish between regulatory processes and task work as they are intertwined and regulatory processes are not restricted to verbal behaviour. Team processes might be analysed at the microlevel by coding specific individual behaviour in groups (see Kauffeld & Meyer, this issue), or at the molar level by team members’ self-assessment of team interaction, team conflict, team reflexivity, or shared mental models (see the other articles of this special issue).

TEAM PROCESSES AS MEDIATING VARIABLES

Despite the fact that many team studies are based on input–process–output models, relatively few studies test mediation assumptions explicitly (Stewart & Barrick, 2000). For instance, Hertel et al. (2004) could show that effects of task, goal, and outcome interdependence on the effectiveness of virtual teams were partly mediated by team members’ motivation. Stewart and Barrick demonstrated that both social processes (i.e., team openness-to-communication and conflict) and task-related processes (i.e., shirking and flexibility) mediated the curvilinear relation between task interdependence and team performance.

Recently, team process aspects such as team mental models, team reflexivity, or team climate have attracted a lot of research. However, most of the available studies focus only on parts of a complete test whether process variables mediate the effects of group design and context variables on group effectiveness. Some of the studies show only positive relationships between work design, work context, and team processes. For instance, Curral et al. (2001) reported a positive relationship between innovative task requirements and a team climate for innovation. Other studies reveal only positive relationships between team processes and team effectiveness. For example, Austin (2003) showed that transactive memory is positively related to the performance of organizational teams. Carter and West (1998) reported positive relations between team reflexivity and team effectiveness,
as well as between team climate for innovation and team member mental health. Hackman and Morris (1975) have previously provided empirical data on positive effects of within team discussion of task strategies (i.e., team task reflexivity) on creativity of group products. Other studies have demonstrated positive relations between team climate, team innovation, and team performance (Bain, Mann, & Pirola-Merlo, 2001; West & Anderson, 1996).

Among the relatively few studies that tested the complete mediation process is the study of Bass, Avolio, Jung, and Berson (2003), who showed that group potency and cohesiveness can partially mediate effects of transactional and transformational leadership. In a similar way, Sy, Côté, and Saavedra (2005) reported that the relation between leader mood and group coordination is mediated by positive and negative group affective tone. Antoni (2005) reported that team climate for innovation mediates effects of team task structure on team innovation, i.e., self-regulating teams reported more process improvements than restrictive teams. De Dreu (2007) provided evidence that team learning can mediate effects of cooperative outcome interdependence and task reflexivity on team effectiveness. However, the proposed mediation processes were not always successfully confirmed (e.g., Cannon & Edmondson, 2001; Porter, 2005). Together, more research is needed to explain the mechanism leading to group effectiveness and the conditions under which they operate.

**MODERATING EFFECTS OF TASK STRUCTURE AND TEAM TYPE**

There is widespread agreement that the structure and characteristics of team tasks are key factors for the development of a team and of team processes. However, team task structure not only should be perceived as input variable but also as a moderator of team processes on team effectiveness (see Hackman & Morris, 1975). In fact, the effects of certain group behaviour on team effectiveness depend to a substantial extent on the nature of the task, the availability of adequate material resources such as technical equipment or quality of supplies, and on other contextual variables (Goodman, Devadas, & Hughson, 1988).

Early taxonomies of team tasks (e.g., Steiner, 1972) have enabled fruitful laboratory research, for instance, on team members’ motivation as a function of the combination of individual contributions. As teams in organizations usually perform different types of tasks as part of their work assignment, categorizing existing organizational teams according to their predominant collaboration pattern can be difficult. Nevertheless, theoretical implications from laboratory research with certain task structures can be successfully replicated in more complex settings. For instance, the
motivational implications of being indispensable for the team were investigated with conjunctive task structures in the laboratory (e.g., Hertel, Deter, & Konradt, 2003) and could be replicated within existing business teams using the degree of task interdependence instead of a conjunctive task structure (Hertel et al., 2004).

Alternatively, teams might be characterized according to the amount of time they spend on different tasks in order to test for moderating effects. Only few studies have analysed moderating effects of team task structure yet (Gladstein, 1984; Stewart & Barrick, 2000). For instance, Stewart and Barrick (2000) found partial support that team task structure moderates the relationship between team processes and team performance. They defined task structure as the time team members spend on conceptual or behavioural tasks (Stewart & Barrick, 2000). As expected, conflict and shirking relationships were more strongly related to performance for conceptual than for behavioural tasks. Furthermore, the reported mediation of team processes regarding the effect of task interdependence on team performance was stronger for conceptual than for behavioural tasks. Contrary to their hypotheses, no moderation effects of task structure were confirmed regarding the effects of team communication and flexibility on team performance. This corresponds to the findings of Gladstone (1984), who also found no moderation of task complexity on the effects of openness-to-communication, discussion of performance strategies, and boundary management on team task performance. A recent meta-analysis provides support that task interdependence moderates the relationship between team-efficacy and performance, but not between potency and team performance (Gully, Incalcaterra, Joshi, & Beaubien, 2002).

In practice, it often is possible to determine which process variable is most important for a given task simply by inspection (Hackman & Morris, 1975). As teams are often labelled and classified according to the tasks they do, a first step to reveal moderating effects is to compare input–process–outcome relationships for different types of teamwork in the organizational context. If different team types, such as project teams, quality circles, or self-regulating work teams, show different relationships between team processes and effectiveness, these findings can guide further specifications of theoretical modelling, as well as the design and implementation of organizational interventions. In a next step, more elaborate measurements of team task structure might be used, such as assessing the time team members spend on conceptual versus behavioural tasks.

Nevertheless, team types can be used as a first estimate of the type of tasks a team is primarily engaged in. For example, project teams or task forces are set up to solve novel, unique, and complex problems affecting several organizational functions. Similarly, quality circles are small groups of workers, who meet voluntarily to discuss and solve their quality and other
work-related problems. As both types of team are established for problem-solving and optimizing tasks, one can assume they perform primarily conceptual tasks. Work teams in productions, e.g., assembling products, perform more primarily behavioural tasks with more or less conceptual add-ons, depending on their degree of self-regulation and task-regulation requirements (Hacker, 2003). Yet little is known about differential effects for different types of teamwork.

One of the studies comparing the effects for different types of teamwork reports significant differences. Cohen and Bailey (1997) reviewed research from 1990 to 1997 on team effectiveness for four types of teams, which they identified in organizational practice: (1) project teams; (2) parallel teams, such as quality circles; (3) work teams; and (4) management teams. Their team types, exempt management teams, correspond to ones proposed by Sundstrom et al. (1990), who differentiate teams according to the need for external integration and differentiation inherent in the relation between a team and the surrounding organization, as well as by Antoni (1990), who differentiates according to the degree of external integration as well as to the degree of participation or self-regulation in not-integrated, parallel, and temporary teams with high versus low participation (quality circles vs. project-teams) and integrated stable teams with high versus low participation or self-regulation (seamautonomous work groups vs. classic manager-led teams; see Hackman, 2002, for a similar differentiation). Cohen and Bailey (1997) report that type of team matters for performance. Performance and attitudinal benefits from self-directed work teams were superior to parallel teams, suggesting that group autonomy and self-regulation have stronger effects than consultative participation. Autonomy was related to higher performance for work teams, but not for project teams. Functional diversity had no effect on team performance in work teams but showed effects in parallel teams, as well as mixed effects in project and management teams. Further evidence for differences due to team task and team type is provided by, for example, Bain et al. (2001). They showed that the relationship between team climate for innovation and individual and team innovation was stronger for research teams than for development teams. These findings underpin the proposition of Hackman and Morris (1975) that no single theory can simultaneously encompass the complexity of group task effectiveness, and their plea for more specific theories for specific aspects, phases, or circumstances of team effectiveness.

**THIS ISSUE**

This issue presents four articles that deal with different types of teamwork ranging from semiautonomous work teams in manufacturing and productions support, service teams with trading and back office tasks in the
financial sector to project teams, which had to find innovative solutions to business problems. They also focus on different aspects of input–process–output models of group effectiveness, but share a common interest in self-regulating processes in or of teams.

Agneta Brav, Kin Anderson, and Annika Lantz analyse in their study how job design, cooperation, and social support influence group reflexivity, initiative, and self-organizational activities. Based on action regulation theory they assessed the task requirements of semiautonomous work groups in manufacturing and production support. Task requirements with respect to task completeness, demand on cooperation, cognitive demand, and demand on learning were obtained by observations and complementary interviews of trained workers carrying out the various work tasks, whereas the other variables were obtained by self-assessment. The study shows in accordance with the hypothesized path model a positive path from task design to group reflexivity, i.e., the extent to which team members collectively reflect upon the team’s objectives, strategies, and processes. Group reflexivity, in turn, shows a positive path to self-organizational activities of the group, such as initiating and developing new work tasks and routines, improving working conditions, and widening group autonomy and responsibilities. Contrary to expectations, group reflexivity shows no path to group initiative. Rather, group initiative, i.e., whether groups have an active and self-starting approach to work goals and tasks and are persistent in overcoming barriers and setbacks, can be explained by group cooperation and social support and seems to predict self-organizational activities.

Team members have to communicate with one another if they want to reflect collectively on their goals and strategies and want to develop common action plans. Simone Kauffeld and Renee Meyers analyse such communication patterns of work group discussions about optimizing tasks of blue-collar work teams in the automobile and chemical industry. In particular, they show how communication patterns develop: Complaining begets further complaining and inhibits solution-oriented statements. In a similar way, solution-oriented statements are often followed by more solution-oriented statements. The support of complaining or solution-oriented statements, in turn, can establish complaining or solution-oriented discussion patterns. However, the results reported also suggest that specific structuring statements can be used to inhibit negative communication circles in group discussions.

Another important aspect of team self-regulation and performance is temporal planning. This is especially true for project teams, which have to finish their project task until defined deadlines. Josette Gevers, Wendelien van Eerde, and Christel Rutte show in their study that temporal planning in early project stages and temporal reminders in later project stages help to develop temporal consensus. Temporal consensus increases the ability of
project teams to establish coordinated action and to meet deadlines. Interestingly and contrary to the hypotheses, temporal reflexivity did not contribute to temporal consensus but was indicative for time-related conflicts within the teams.

Whereas the articles mentioned so far focus on group self-regulation and group behaviour, Udo Konradt, Panja Andreßen, and Thomas Ellwart analyse how individual self-leadership influences performance in service teams in the financial services with trading and back office tasks. Furthermore, they explore whether this relationship is moderated by team characteristics. The results of their multilevel study show that self-leadership of team members is positively related to individual performance. Moreover and in line with their assumptions, this relationship is partially mediated by self-efficacy and instrumentality perceptions of the team members. Furthermore, the study shows that both intrateam task and relationship conflicts as group-level variables were negatively related to team member performance. However, contrary to expectations, the relationship between self-leadership and performance did not vary between teams, providing no evidence for moderating effects of team characteristics (i.e., autonomy, task type, conflict level). As explanation for the lack of moderating effects, the authors suggest that self-leadership might be more strongly influenced by personality characteristics of the individuals.

Although all four studies differ somewhat in their focus, they all describe self-regulation processes in or of teams, demonstrating that self-regulation is important for team effectiveness and team development at the individual and team level. In the study of Konradt and his colleagues, self-leadership predicts the performance of team members. One aspect of self-leadership is the ability to identify and change dysfunctional beliefs and thought patterns. Complaining circles identified by Kauffeld and Meyers could be perceived as a collective dysfunctional thought and behaviour pattern. Attempts of team members to stop such complaining circles with structural statements might be both an indication of self-leadership and team self-regulation. Brav and her colleagues show that collective reflection processes correlate positively with self-organizational team behaviour, such as initiating and developing new work tasks and routines, improving working conditions, and extending group autonomy and responsibilities. Similar to contextual performance (Motowidlo & van Scotter, 1994), self-organizational team behaviour can be perceived as an important aspect of team performance in modern organizations, supplementing traditional task performance. Gevers and her colleagues report no effect of team temporal reflexivity on temporal consensus and the effectiveness of project teams to meet their deadlines. However, the reported correlations show that team reflexivity at early project stages significantly correlates with meeting deadlines at the end. This corresponds with other findings showing that team reflexivity can be positive
for team performance (Carter & West, 1998; Gurtner, Tschan, Semmer, & Nägele, 2007; Tjosvold, Tang, & West, 2004), especially when appropriate task strategies have to be developed. Task strategies have to be developed and collectively reflected when a group starts working on a novel task, as in early phases of a project, when problems with the existing task strategy arise, or when team members disagree on strategies, deadlines, etc. The latter is at least not helpful for successfully finishing a project, which is indicated in the study of Gevers and her colleagues. As both studies by Brav et al. and Gevers et al. report no significant correlations between team reflexivity and team cooperation or coordination, the mechanisms how team reflexivity affects performance have to be analysed in further research.

The results of the studies by Brav et al. and Gevers et al. also indicate that the effects of team reflexivity might differ depending on the type of teamwork, team task, the phase of team development, the type of performance criteria, and the focus of reflection. For example, project teams are typically formed to solve novel tasks and problems within a given timeframe, and are dissolved after these goals are accomplished or the time scheduled is over. The development and test of adequate and shared task strategies, team roles, responsibilities, and realistic schedules that require collective task and social reflection processes seems crucial in early phases of the project in order to get going and finish the project in time. In later phases of the project, discussions about schedules and deadlines seem to be less useful for meeting deadlines. Things might be different for collective reflections about how unexpected problems could be solved, but Gevers and her colleagues did not measure these aspects. In contrast, established production teams, as analysed by Brav and her colleagues, are characterized by a broader mixture of routine and nonroutine, optimizing, and innovating tasks they work on as part of their daily work, with more or less changes over time. It appears plausible that regular collective reflection processes, e.g., once a week, focusing on recent experiences, new information and knowledge, as well as the assumptions about issues under discussion influence the development work tasks, responsibilities, and the change of working conditions. For these reasons, inconsistent findings on team reflexivity might be explained by the focus of reflection and the type of teamwork analysed.

Apart from different constructs of team self-regulation, the four articles of this special issue also illustrate various methodological approaches to study team processes. Gevers and her colleagues analyse team processes in a longitudinal design, which enables interesting analyses of causal relationships. Kauffeld and Meyers demonstrate the strengths of detailed observational analyses based on video documentation of team interaction process cycles that are later encoded based on existing coding schemes. In contrast to retrospective self-assessments of team processes, these data are less biased
by memory or motivation of participants and allow a more reliable view on the development and change of interaction processes. Future studies might use such observational codings to explore how interaction patterns might be related to team characteristics and team outcomes. Based on these results, causal effects of team development interventions, such as moderation and reflection techniques (e.g., Gurtner et al., 2007), might be explored.

The observation-based work analysis of task requirements used by Brav and colleagues offers another interesting and complementary approach to traditional self-assessments of task characteristics. Combining different approaches for assessing team task characteristics might also help to better understand individual and collective task redefinition processes, which are a precondition for individual and collective self-regulation and self-leadership. It would be interesting to analyse how individual self-regulation and self-leadership of team members influence collective self-regulation and self-leadership, and vice versa, particularly over time as this allows individual and team learning, and depending on different types of goal, task, and reward interdependencies.

Of course, this special issue only addresses a small selection of team processes and related antecedents and consequences. However, we hope that this work might stimulate further research on this fascinating and promising topic. A sound understanding of team processes and their differential impact in different types of teams, task structures, and organizational contexts is at the core of a psychological analysis of teamwork, and a precondition of effective and enduring interventions in teams and organizations.

REFERENCES


