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Understanding Direct and Indirect Effects of Team Process Improvement: A Conceptual Framework

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A Conceptual Framework¹

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Abstract

Team process improvement, a key factor to enhance and sustain team as well as company success, is known as the continuous reflection and adaptation of team work behaviors. In this article a conceptual framework which models team process improvement is presented. After defining the concept its two-dimensional structure and its relation to team performance, the explanatory value of collective cognition and affective-motivational variables acting as mediators, and team characteristics as moderators (i.e. task interdependence and the degree of virtuality) are derived. Finally, implications for research and management of process improvement in teams follow.

Keywords: Team process improvement; Explicit coordination; Reflexivity; Team adaptation; Mediation; Moderation.

1 Introduction

Work teams have become the fundamental unit in organizations. Teams are advantageous over the single individual as members' different knowledge, skills, and abilities can be bunched to synergies which enhance team and company success (Cohen & Bailey, 1997; Rousseau, Aubé, & Savoie, 2006). Work groups are considered as more flexible, accomplish better decision making and gain increased productivity, innovation and employee satisfaction (Rousseau et al., 2006). However, to assure (team) success it is not enough to just arrange individuals to groups; strategies and work behaviors must be continuously combined, structured and processed in a well coordinated manner in order to accomplish work groups acting as one unified whole (cf. Sessa & London, 2008). Furthermore, due to increasing environmental forces (e.g., globalization, clashes of culture, technological challenges, and highly competitive surroundings) work around companies and particularly teams must be restructured and constantly coordinated. Teams are pushed to continually harmonize, reflect and adapt to mitigate altering internal and external requirements (Kozlowski & Ilgen, 2006).

A concept which deals with the managing of team's internal functioning is team process improvement. Team process improvement refers to a learning procedure describing team's reflection of past activities and the adaptation for future work behaviors (Edmondson, 1999, 2002; West, 1996, 2000). With regard to the input-process-output (IPO) model and its latter-day derivatives (e.g., input-mediation-output-input, IMOI) the concept is called a transition process within a specific performance period (Hackman, 1987; Ilgen, Hollenbeck, Johnson, & Jundt, 2005; Marks, Mathieu, & Zaccaro, 2001).

Past research handled team process improvement as a unidimensional model, although some scholars have accentuated its multidimensionality, e.g. the subconstructs of team reflection and team adaptation (Edmondson, 2002; West, 1996). As increased importance has been given to a proper specification of constructs in order to gain a holistic understanding for future research and management practice, team process improvement's dimensionality needs to be examined intensively (cf. Edwards, 2001; LePine, Piccolo, Jackson, Mathieu, & Saul, 2008).

With regard to team process improvements' relation to outcome measures a small but growing body of literature has recently found empirical evidence for a positive direct impact (e.g., Carter & West, 1998; Hirst, Mann, Bain, Pirola-Merlo, & Richter, 2004; Schippers, Den Hartog, Koopman, & van Knippenberg, 2008; Schippers, Den Hartog, Koopman, & Wienk, 2003; Somech, 2006; Tjosvold, Tang, & West, 2004; Van Ginkel, Tindale, & van Knippenberg, in press; Wiedow & Konradt, 2011). Although findings mainly support the linear positive relation to outcome variables, doubts about an exclusive monotonic nature have arisen (Bunderson & Sutcliffe, 2003). Team process improvement can consume resources which in turn may have negative effects on outcome variables. Thus, a theoretical framework helping to clarify the relation between team process improvement and performance is desired.

To the best of my knowledge, despite first attempts of enhancing our understanding regarding team process improvement, comprehensive conceptual approaches which integrate and combine recent theoretical frameworks are lately missing. This paper aims to close this research gap by presenting a theoretical framework focusing on team process improvement. Existing and well established concepts are integrated and a model based on new research approaches and foundations is developed. This framework is intended to improve and nuance research and management practice on team processes, particularly improvement processes.

After defining team process improvement and delineating the term to related concepts, its dimensionality distinguishing team reflection and team adaptation follows. The relation to team performance and this relation underlying indirect mediating effects (i.e. shared mental models and interpersonal trust) will be discussed. As specific organizational context variables (i.e. moderators) are highly influential in stimulating relations to criteria situational moderating characteristics (i.e. task interdependence and virtuality) are additionally integrated (cf. Gibson & Vermeulen, 2003). It is suggested that research that neglects interdependence has hardly any value for knowledge development about team processes and effectiveness task interdependence is considered (Kozlowski & Bell, 2003). Presently a majority of teams' members across many organizations works (partly) distributed and communicates via electronic media (cf. Webster & Staples, 2006). The omnipresent current and future team phenomenon of virtuality alters notably the interactions and work activities among members (Gibson & Gibbs, 2006; Kirkman, Rosen, Tesluk, & Gibson, 2004). Particularly, the effect of team process improvement on performance might be different in high virtual teams vs. less virtual teams. Thus, the degree of virtuality is included as potential moderator.

Finally, consequences for future organizational and management research pertaining to laboratory and field settings, qualitative and quantitative studies will be discussed to improve the understanding of team process improvement and to derive generalizable implications.

2 Theoretical Foundations

Team Process Improvement

Team process improvement plays the major focus within the conceptual framework. The concept is understood as the conscious reflection of past team activities, and derived alternative recommendations for work strategies and methods (Edmondson, 1999, 2002; West, 1996, 2000). Specific work behaviors executed by process improving teams consist of seeking and giving feedback, discussing errors, mirroring critical team-related work processes, and adapting and implementing altered activities in the work process. Figure 1 illustrates the central part of team process improvement with its direct and indirect relations.

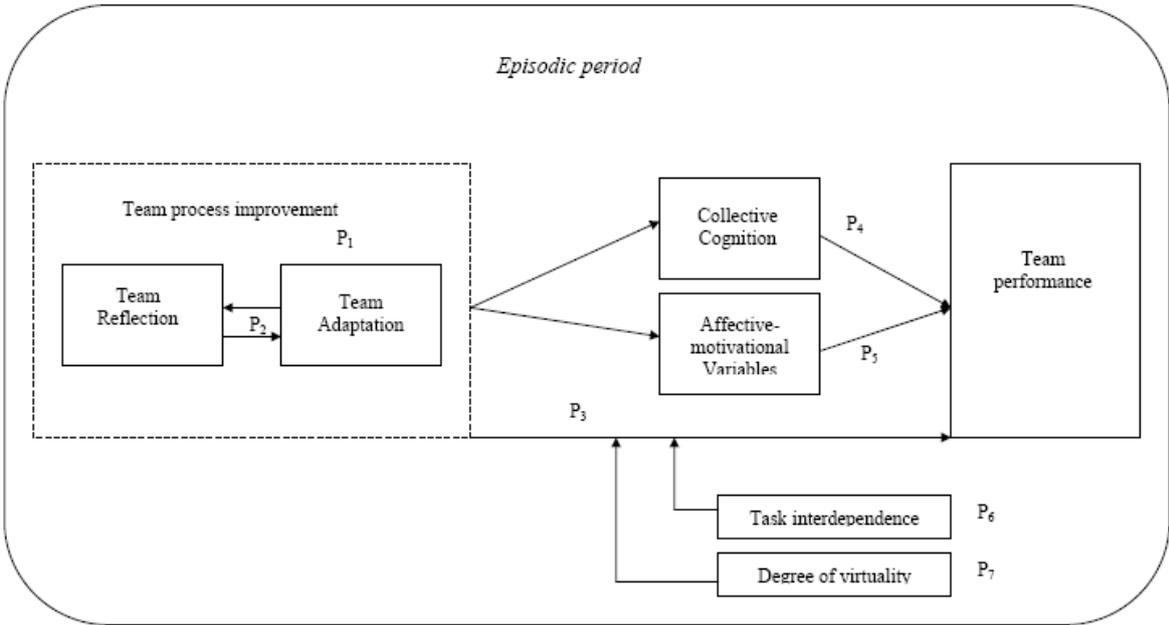


Figure 1. Research Framework

Based on the IPO model team process improvement is considered as one of the key team processes translating input into outcome variables (cf. Hackman, 1987). Despite the framework's popularity and convenience of team factor classification this framework is rather static, ignoring temporal considerations (Mohammed, Hamilton, & Lim, 2008). Scholars have recently and forcefully called for increased attention to the time affect when examining work groups as team dynamics particularly develop and change over time (Ilgen et al., 2005; Marks et al., 2001; Mathieu & Schulze, 2006; Mohammed et al., 2008). Ancona, Okhuysen, and Perlow (2001) developed the idea that a team runs through several episodic periods and various stages toward maturity. Thus, performance outcomes unfold cyclically within longer time periods. The presented conceptual framework demonstrates one potential episodic period; acknowledging that the results in response appear as input characteristic influencing

team process improvement of a new episodic period. Long-term efforts are thought to happen in recurring fashion over time in episodes related to performance.

Previous research focusing on team process improvement has discussed the concept by using different expressions. Scholars have developed terminological differences like group learning (Argote, Gruenfeld, & Naquin, 2001), team learning (Edmondson, 1999, 2002), task reflexivity (West, 1996, 2000), and process improvement (Kirkman et al., 2004). However, by means of analogous conceptualizations all approaches focus on the aspects of retrospection of prior team activities (i.e. team reflection) and the implementation of new strategies or procedures for the workflow (i.e. team adaptation). For example, group learning as a general approach spanning all kinds of groups is understood as a process involving activities through which individuals acquire, share, and combine knowledge through experience (Argote et al., 2001). Focusing on work groups, Edmondson (1999) describes team learning as team members' activities of acquiring and processing data that allow them to adapt. An almost identical concept is reflexivity (Edmondson, Dillon, & Rolloff, 2007), which refers to the degree to which members of a team openly reflect upon, and communicate about the team's objectives, strategies (e.g., decision-making) and processes (e.g., communication), and adapt them to present circumstances (West, 1996). Kirkman et al. (2004) introduce the delineated term process improvement but do not present an independent definition but refer indeed to Edmondson's team learning concept.

Researchers have conducted several studies aimed at understanding team process improvement (see Homan, Schippers, & van Knippenberg, 2009, for a review). However, these investigations have mostly treated the concept as a one-dimensional one, although according to the definition two distinct but associated subconstructs are obvious: team reflection and team adaptation.

However, scholars have called attention to further and deeper developments of constructs, particularly of proper and detailed specifications of the dimensionality (cf. Edwards, 2001; LePine et al., 2008). Thus, a holistic representation of the complex team process improvement phenomena distinguishing team reflection and team adaptation is inevitable and contributes to clarity, precision, accuracy and an expanded understanding.

Two-dimensional structure of team process improvement: Team reflection and adaptation

Team reflection and team adaptation are two distinct but correlated constructs which are described as followed:

Team reflection. Basically, reflection has been seen as a highly personal cognitive and natural process. Individuals regularly reflect by taking a situation from the environment, bringing it inside the mind, thinking about it, filtering it and drawing consequences for the future; reflection means to step back from an experience and to carefully ponder the meaning (Daudelin, 1996). Besides considering individual reflection (e.g., Rennie, 1992), the construct is likewise essential in the field of work groups and organizations as effective teams are forced to reflect as a whole group in order to cope with challenging dynamic environments. West (2000) describes team reflection as a collective examination of tasks, methods, resources, and team related efforts which entails questioning, planning, analysis, diverse exploration, use of knowledge and reviewing past events with self-awareness. Similarly, reflection by Edmondson (2002) is behavior that fosters new insights about work but without any action taking. An appropriate reflecting team is more (group-self) aware of the consequences of its activities and is more proactive. In contrast, a non-reflective team simply functions without any self-awareness on the part of the team members' behaviors.

Reflection is an essential condition for developing new, alternative work strategies within a team, but reflection alone is not sufficient. There is a difference between intending to enact and actually enacting. Forming an intention is not the same as carrying it out, therefore, it is not sufficient simply to reflect about past activities and to know the necessity of modification, the implementation of adapted actions has to happen.

Team adaptation. Team adaptation is understood as the production of change, i.e. activities involving action taking such as making decisions, initiating changes and experimenting (Edmondson, 2002). According to West (2000, p. 6) adaptation refers to 'goal-directed behaviors relevant to achieving the desired changes in team objectives, strategies, processes...'. Burke, Stagl, Salas, Pierce, and Kendall (2006) went beyond this definition and developed a broader team adaptation model in which the construct is considered as being manifest in the modification of existing work structures, behaviors and actions. The presented conceptual framework focuses on a more restricted definition pertaining to the extent to which teams live up to agreements (Schippers, Den Hartog, & Koopman, 2007), rather than a general adaptation understanding (cf. Burke, Salas, & Diaz, 2008; Burke et al., 2006; LePine, 2003).

The aforementioned explanations regarding team reflection and team adaptation lead consequently to the assumption that both are different, but associated dimensions of team process improvement. The first dimension is rather the 'thinking' part whereas the second dimension represents 'doing' behaviors. Members of a project work team, for example, might discuss the progress of recent work in terms of planning, first decisions, and mistakes. New enhanced and improved strategies and approaches for future work are discussed (e.g., the necessity of regular team meetings instead of ad hoc ones), but if the essential

implementation is missing (e.g., concrete date for a regular meeting) the team do not live up to the agreements and the team process improvement does not work properly.

Although team process improvements' dual focus of team reflection and team adaptation are widely theoretically accepted (e.g., Homan et al., 2009), empirical investigations remain sparse. An exception is the research by Wiedow and Konradt (2011) who conducted two studies, an experimental one and a cross-sectional field study in order to test the two-dimensional structure of team process improvement. Results analyzed by confirmatory factor analyses supported the hypothesis and clear evidence for the distinct subconstructs of team reflection and team adaptation has been found. Based on the theoretical assumptions and first empirical results it is proposed, that team process improvement consists of the two distinct but correlated dimensions, namely team reflection and team adaptation.

Proposition 1: Team process improvement is characterized by a two-dimensional structure including the sub-constructs of team reflection and team adaptation.

The Relation between Team Process Improvement's subconstructs

Although the distinction of team process improvement's subconstructs, i.e. team reflection and team adaptation, is reasonable, questions about the temporal relation of the both factors arise. A direct causation model expecting that team reflection is followed by adaptation seems to be logic as it might be the subsequent step after the development of new and changed ideas, objectives and strategies during the reflection phase. A further possible, but less reasonable alternative might be a reverse causation model. This consideration includes team members' spontaneous engagement in team adaptation, followed by a systematic and structured reflection process which is characterized through adaptation insights. As it is not based on a systematic analysis of incidents, this possibility is supposed to be less efficient, but nevertheless might occur in real organizational settings. Finally, a mutual interaction between team reflection and team adaptation is also supposable, i.e. a cyclical model. This option is favored by scholars who emphasized the continuous reciprocal relation between team reflection and adaptation (Edmondson, 2002; London & Sessa, 2007). The mirroring of past work behaviors has an impact on adaptation as team members keep to agreements made during the reflection phase and current work structures are accomplished alternatively. In turn, these adapted behaviors impact reflection as team members discuss the altered activities (Edmondson, 2002). Multiple adequate iterations ensure a holistic team improvement process. Imagining the project work team again, the reflection of first work progress leads to adaptation (e.g., daily meetings) which activates the reflection (e.g., discussion about the duration of meeting) anew. Hence, after a certain amount of iterations between reflection and adaptation an optimal team process improvement (regarding the team meeting) appears.

Proposition 2: In a given period the team process improvement's subconstructs (i.e. team reflection and team adaptation) are related cyclically and interact mutually.

The Relation of Team Process Improvement to Team Performance

The relation between team process improvement and team as well as organizational outcome measures has been investigated by several studies (e.g., Carter & West, 1998; Hirst et al., 2004; Homan et al., 2009; Schippers et al., 2008; Somech, 2006; Tjosvold et al., 2004; Van Ginkel et al., in press; Van Ginkel & van Knippenberg, 2009). Evidence for a positive, direct and linear relation to team performance was convincingly found among the studies covering all kinds of research designs, e.g. experimental studies (e.g., Van Ginkel & van Knippenberg, 2009), cross-sectional field studies with heterogeneous work teams (e.g., Carter & West, 1998; Tjosvold et al., 2004), and longitudinal studies with student groups (e.g., Homan et al., 2009). A direct linear relation between team process improvement and outcome measures is plausible as emphasis on reflection and adaptation help team members to continually refine procedures and thus achieve high quality team objectives. However, despite the growing body of literature accentuating the linear relation some scholars have argued that team process improvement behaviors do not invariably lead to higher team performance. These activities may be indeed inefficient or dysfunctional under certain circumstances (Bunderson & Sutcliffe, 2003).

It has been argued that too much focus on team process improvement can diminish team outcomes just as too little focus on team process improvement can diminish team performance. Overemphasizing team reflection and team adaptation are time-consuming without assurance of long-term positive results (Edmondson, 1999). As too much (good) variations, new developments, implementations and experimentations can not effectively assimilated and retained in the daily work, team performance might be influenced detrimentally (Levinthal & March, 1993; March, 1991). Contrarily, teams underemphasizing team process improvement generate insufficient insights about past team work behaviors and adapt current strategies improperly which in turn might also reduce team performance. Therefore, a moderate level of team process improvement is assumed, a dynamic equilibrium of appropriate reflections and adaptations resulting in sustainable and increased team performance (Bunderson & Sutcliffe, 2003).

As to date hardly any study has empirically investigated the possibility, that team process improvement is not uniformly beneficial. As notable exception, the results of the cross-sectional study by Bunderson and Sutcliffe (2003) showed that team process improvement (in that study named as team learning orientation) enhanced overall team performance but an extreme focus on improvement detracted performance, particularly when the team has been performing well.

Thus, it is proposed that a moderate level of team process improvement contributes optimally to multiple team performance criteria, such as product/service quality and quantity, timeliness, productivity, and/or accurate decisions (Gibson, Zellmer-Bruhn, & Schwab, 2003; Mathieu, Maynard, Rapp, & Gilson, 2008).

Proposition 3: Team process improvement is curvilinear related to team performance, i.e. at low or high levels of team process improvement, team performance is lower than at moderate levels of team process improvement.

Undoubtedly, establishing relations between independent and dependent variables is necessary for claiming that two variables are causally related. However, yet nothing is said about how and why team process improvement and team performance are related. Thus, of great scientific importance is also clarifying by what means this relation occurs (MacKinnon, 2008; Mathieu, DeShon, & Bergh, 2008). Cognitive and affective-motivational variables are regarded as potential mediators with explanatory power due to the fact that team tasks require intellectual as well as social collective resources.

Shared Mental Models as Collective Cognition Mediator

Shared mental models (SMMs) are known as one type of collective cognition (cf. Cooke, Gorman, & Rowe, 2008, p. 161). Based on studies regarding individual mental models (Rouse & Morris, 1986), SMMs are the organized understanding of relevant knowledge regarding critical team work that is shared by the team members (Klimoski & Mohammed, 1994; Mathieu, Heffner, Goodwin, Cannon-Bowers, & Salas, 2005). Each individual member has mental representations regarding team-related information, i.e. how team tasks, interactions, and/or roles among all team members fit together (e.g., Mohammed, Klimoski, & Rentsch, 2000). Cannon-Bowers, Salas, and Converse (1993) developed a classification of multiple and simultaneously existing mental models including technology, task, team, and team interaction. Despite this widely accepted typology researchers have mainly given attention to a dual strategy, namely task SMMs and team SMMs (Mathieu et al., 2005, 2008). Task SMMs refer to team members' common representation of job assignments, responsibilities, and environmental circumstances whereas team SMMs represent shared knowledge about the team members' interactions.

A large amount of studies have supported the positive direct impact of SMMs on team coordination and performance (e.g., Marks, Zaccaro, & Mathieu; 2000; Mathieu et al., 2005; Salas, Sims, & Burke, 2005). Furthermore, a small but growing body of literature has considered SMMs as indirect effect, mediating between independent variables and criteria. For example, Gurtner, Tschan, Semmer, and Nägele (2007) assumed that a team-interaction SMM acts as a mediator of the relation between reflexivity (i.e. team process improvement) and performance. Within a laboratory design study participants, who were organized in hierarchically structured groups, had to solve a computer-simulated, team-based task. The findings indicated that reflexivity led to better performance while being mediated by the team-interaction SMM. These findings have been replicated by a further experimental study and enhanced by a cross-sectional field study which gave additional support for the generalizability of the results (Wiedow, Ellwart, Steenfatt, & Konradt, 2009).

It is assumed, that the relation between team process improvement and team performance is mediated by collective cognition (SMMs as an exemplary case) as team reflection and team adaptation account for appropriate representations and shared knowledge of team and task related issues among the team members, which in turn leads to performance. Thus, the following assumption is posited.

Proposition 4: In a given episodic period team process improvement and team performance are partially mediated by collective cognition.

Interpersonal Trust as Affective-motivational Mediator

Besides collective cognition affective-motivational variables are considered as relevant mediators within team work relations (Mathieu et al., 2008). Despite the acknowledgment of motivation's importance systematic examinations of how affective-motivational variables, clearly defined and carefully operationalized, influence indirectly group outcomes, are not fully comprehensive and congruent. But team members' emotions and affects which are assigned to the group level accompany the mutual, intensive social interactions among individuals which in turn may influence the performance of the whole group (Kelly & Barsade, 2001).

Interpersonal trust is one prominent example of affective-motivational variables (Mathieu et al., 2008). Although a myriad of different construct definitions exists, some aspects delineating interpersonal trust are inherent across all conceptualizations (Costa, Roe, & Taillieu, 2001). Positive expectations and the willingness to become vulnerable are critical elements to characterize trust. Although researchers have emphasized cognitive- and affective-based dimensions of trust, the affective-motivational component is strengthened in this framework as interpersonal trust arises from emotional bonds between team members; they have to feel trust (cf. Webber, 2008). Empirical evidence for interpersonal trust's direct effects on outcome variables has been shown (e.g. Costa et al., 2001) as well as its potential indirect mediating nature (e.g., Ayree, Budhwar, & Chen, 2002). The investigation by Wiedow et al. (2009) demonstrates first empirical evidence for the explanatory value of affective-motivational variables. Results of a cross-sectional field study supported interpersonal trust as mediating effect between team process improvement and team performance. However, despite these encouraging findings, research on affective-motivational mediators is limited.

Team's process improvement triggers affective-motivational mechanisms which in turn have an impact on team performance the following proposition is assumed.

Proposition 5: In a given episodic period team process improvement and team performance are partially mediated by team affective-motivational variables.

Work groups are not created equally, they do not perform under the same circumstances and team members differ in terms of their personalities (Kozlowski & Bell, 2003; Kozlowski & Ilgen, 2006). Thus, direct and indirect effects of team process improvement on team outcomes do not work in the same way in any kind of team, such as research and development teams, medical surgery work groups or teams of public administration. Features of the task and the context within work teams usually operate may play a critical role and should not be neglected (Johns, 2006). Research on work teams has suggested that specific organizational variables (i.e. moderators) are highly influential in stimulating this relation (cf. Gibson & Vermeulen, 2003). A moderator variable modifies the form or strength of the relation between predictors and criteria. In the presented conceptual framework situational moderators, i.e. task interdependence and the degree of virtuality are

considered as particularly relevant in shaping the effects of team process improvement on team performance.

Task Interdependence as Moderator

Following Kozlowski and Bell (2003) task interdependence is suggested as a key characteristic of the organizational perspective on work groups. Task interdependence refers to the degree of team members' task-driven interactions (Gully, Joshi, Incalterra, & Beaubien, 2002). When team tasks are highly interdependent employees need to communicate more often and intensively; each individual needs to know what is going on in the team, who is doing what, which resources are used, etc. Thus, team members communicate very thoroughly.

Based on the postulation, that research which fails to consider interdependence has limited relevance for building general knowledge on team work, empirical investigations supported task interdependence's relevance as a moderating variable (e.g., Gully et al. 2002; Kozlowski & Bell, 2003). However, why would task interdependence moderate the relation between team process improvement and team performance? It is argued that teams with highly interdependent tasks are used to communicate and exchange information among all team members to successfully accomplish the task. Team process improvement teams working on less interdependent tasks are not required to regularly improve, reflect, and adapt all strategies as the tasks can be accomplished without intensive information exchange among all members. Thus, the effect of team process improvement on team performance might be different in highly vs. less interdependent work groups.

Proposition 6: Task interdependence moderates the relation between team process improvement and team performance. Particularly, the effect of team process improvement on team performance is greater when teams work highly interdependent.

Degree of Virtuality as Moderator

Nowadays it is hard to find teams that remain collocated with exclusive dependence on face-to-face communication. Almost every work group uses some kind of media or technology to coordinate the accomplishment of team's tasks. Thus, the distinction between pure or 'fully' virtual and non virtual (traditional or collocated) work teams has become obsolete (Gaudes, Hamilton-Bogar, Marsh, & Robinson, 2007). Researchers have turned to a more reasonable approach which describes team virtuality on a continuum, i.e. a degree of high or less virtuality (Fiol & O'Connor, 2005; Griffith, Sawyer, & Neale, 2003; Hertel, Geister, & Konradt, 2005; Kirkman et al., 2004). However, as the degree of virtuality alters the interactions among team members, particularly coordination mechanism, it is necessary to consider this moderator in a conceptual framework of team process improvement.

Scholars have proposed many different dimensions and definitions of the degree of virtuality, including the physical distance among team members, level, and variety of used technological support, number of sites over which the team is spread, travel time between the sites, number of members per site (i.e., isolation), national diversity within the team or

time zone overlap (Gibbson & Gibbs, 2006; Webster & Staples, 2006). The two basic characteristics focusing on the geographic dispersion among team members and the use of electronic communication media (e.g., telephone, email or shared documents) to describe the degree of virtuality are inherent in almost each definition (e.g., Bell & Kozlowski, 2002; Hertel et al., 2005; Martins, Gilson, & Maynard, 2004).

Under high virtual collaboration conditions the relation between team process improvement and team performance may be different as the quality and quantity of reflection and adaptation change when working geographically distributed and communicating mostly via technologies (Gibson & Gibbs, 2006; Kirkman et al., 2004).

Proposition 7: The degree of virtuality moderates the relation between team process improvement and team performance. Particularly, the effect of team process improvement on team performance is greater when team work conditions are characterized by a high degree of virtuality.

3 General Discussion

The purpose of this paper was to present a conceptual framework on team process improvement with its two-dimensional nature including team reflection and team adaptation, direct effects on team outcomes and this relation explaining indirect mediating factors. Additionally, situational context factors acting as moderators are demonstrated.

After defining and integrating the concept within research and temporal taxonomies (IPO/IMO; Hackman, 1987; Ilgen et al., 2005) the potential two-dimensional structure of team process improvement has been demonstrated. Based on previous assumptions by Edmondson (1999, 2002) and West (1996, 2000) the theoretical separation of team reflection and team adaptation has been strengthened. In the next step this article proposed cognitive and affective-motivational variables simultaneous acting as indirect effects, i.e. mediators which explain the direct relation between team process improvement and team performance. As work groups differ from team to team moderators in terms of task interdependence and the degree of virtuality which are particularly important for the team process improvement-performance link are additionally considered.

One strength of the presented framework is the integration of the increasing research on team process improvement. This is one of the first attempts to consider current approaches and investigations and combine them in one single model. Based on the framework future empirical research may deduce specific theoretical foundations and hypotheses. The model departs from existing theory in that it seeks provide explanations of team process improvement's dimensionality and factors underlying the relation to performance criteria. Previous research has mainly concentrated on the concept as a one-dimensional one and its direct relation to outcome variables (e.g., Gurtner et al., 2007; Schippers et al., 2008). The model illustrates the value of the concept in a broader context of team processes and team work and will help to increase the validity of empirical findings in this area.

Despite the advantages of this framework challenges for future theoretical research and management practice are implied. As research on this topic is currently growing scholars are encouraged to further develop team process improvement models. A first limitation of the conceptual framework addresses the underlying intervening variables. Although two simultaneous acting mediation variables are yet assumed, prospectively other and different intervening variables might be reasonable (e.g., climate variables or conflict). For example, as team process improvement behaviors are associated with discussing and feedback (task and team) conflicts may be triggered, which in turn can positively or negatively lead to performance. Furthermore, this article does not provide any assumption regarding the interrelation between mediators, i.e. their mutual influence on each. Elaborated research designs are needed.

The selection of demonstrated moderators (task interdependence and the degree of virtuality) resulted from their particular relevance for teams and the relation between process improvement and performance. Without doubt, these are hardly the only influential variables. The team level focus is primarily adequate; but to fully understand the characteristics with team process improvement necessitates a multilevel perspective as it is intertwined with individual and organizational levels (Sessa & London, 2008). Individuals are embedded in the teams which in turn belong to organizations, thus these single systems act in nested hierarchical systems influencing each other rather than working autonomously without any mutual affect. Going forward, context should be integrated systematically (Gibson et al., 2003). Norms, rules, and culture or pressure (or opportunity) for innovation, change, and learning from other teams within or outside the company could be important variables for processes, improvement, and outcomes.

Performance criteria mentioned in this article are objective ones on the team level. However, performance is a multidimensional construct and might be individual, organizational or team based (Mathieu et al., 2008). Additionally, considering temporal aspects output criteria are rather proximal or distal and can be measured through different source. Subjective individual criteria, such as satisfaction or commitment are also worth taking into account. All these options have not been integrated in the conceptual framework, although output measures are the central phenomena why team research is done. Teams have to fulfill the tasks effectively and efficiently. Further developments of frameworks focusing team process improvements needs the concentrates on different output criteria and there interactions (Mathieu et al., 2008).

This framework is meant to encourage researchers to investigate the assumptions in a broad range of studies using different methods, e.g., as quantitative and qualitative designs, laboratory and field settings, cross-sectional and longitudinal studies. Methodological research implication should address multilevel mediational approaches which also integrates the examination of moderators. This first approach of a conceptual framework offers new insights on team process improvement which are prospectively needs to be systematically investigated. Future empirical evidence in turn enhances theoretical models for a comprehensive and holistic understanding of process improvement within team work.

Practical Implications

Due to the theoretical assumptions of this article the conceptual framework contributes primarily to theory and research in order to encourage investigations aimed to find empirical evidence. Nevertheless, this paper has also some practical implications. As the assumption of team process improvements' two-dimensional nature seems reasonable, team leaders and members should (learn how to) separately reflect and adapt about team and task related issues in a constructive manner. Space for clear team reflection and team adaptation should be provided by the organization and leaders; in turn members need to use the given room constructively. An appropriate level of team reflection needs to be seen as windows for all imaginable opportunities (Edmondson, 2002; West, 2000). Furthermore, indirect effects and moderators can not be ignored and should be kept in mind when diagnosing team's status and performance. Trainings may help to foster shared mental models and support interpersonal motivation (cf. Salas, Nicholls, & Driskell, 2007).

4 Conclusion

In sum, team process improvement is essential for work teams and organizations due to challenging dynamic and uncertain environments. Team process improvement may lead to better team outcomes, but however indirect effects and situational context variables additionally needs to be focused in order to accomplish best results. This conceptual framework with the nuanced and in-depth model contributes to the discussion and understanding of team work processes.

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