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Self-management competencies in self-managing teams: Their impact on multi-team system productivity

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ABSTRACT

This research examined how composition of individual capabilities within self-managed teams translates into greater effectiveness for multi-team systems (MTS) in which teams are embedded. We investigated how a broad range of self-management competencies by team members aggregate to form a collective construct that influences productivity of a team network. In a semiconductor plant, we surveyed 716 members from 97 self-managed teams in 21 MTS. We found that MTS comprising teams whose members widely practice self-management strategies attain higher productivity gains and that multi-team systems consisting of highly cohesive teams of self-managers are the most productive.

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The emergence of self-managing work teams (SMWT) in corporate America during the past 25 years has been variously proclaimed a management transformation, paradigm shift, or corporate renaissance (Druskat & Wheeler, 2003; Manz & Sims, 2001; Sundstrom, De Meuse, & Futrell, 1990). Katzenbach and Smith's (1993) long-standing projection that "teams will become the primary unit of performance in high-performance organizations" (p. 119) is now a fact of organizational life (Morgeson, 2005). Yet scholarly inquiry into SMWT effectiveness still lags behind such popular acclaim. As SMWT pervade places of work, the question becomes less "are they effective?" but rather "what differentiates more effective from less effective teams?" The current research takes an additional step toward bridging this knowledge gap by considering an array of team members' self-management competencies and how team composition of such individual skills translates into greater performance for multi-team systems (MTS)—multiple teams that interface and interdependently accomplish collective, superordinate goals (Mathieu, Marks, & Zaccaro, 2001).

1. Self-managed work teams and their results

SMWT mark a radical departure in how work is organized and done by assuming responsibility for doing whole tasks and decision-making authority traditionally reserved for management (Banker, Field, Schroeder, & Sinha, 1996; Guzzo & Dickson, 1996; Moorhead, Neck, & West, 1998). American business has increasingly embraced such empowerment structures, which are currently deployed by nearly 75% of the top 1000 US firms (Douglas & Gardner, 2004). Self-managing teams are increasingly transplanted abroad and to virtual team settings (Kirkman, Rosen, Tesluk, & Gibson, 2004; Kirkman & Shapiro, 2001). Since inception, mounting evidence affirms that SMWT enhance work-life quality, customer service, and productivity (Beekun, 1989; Cohen & Bailey, 1997; Cohen & Ledford, 1994; Emery & Fredendall, 2002; Goodman, Devadas, & Hughson, 1988; Katzenbach & Smith, 1993).

In contrast with such favorable findings, several literature reviews concluded that SMWT vary considerably in effectiveness (Beekun, 1989; Cohen & Ledford, 1994; Guzzo & Dickson, 1996). At times, such team structures have undermined work-life quality

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(Barker, 1993) or failed to outperform traditional work groups (Bailey, 1998). Indeed, Gibson and Tesone (2001) alleged that purported SMWT productivity gains are overstated, while Spreitzer, Cohen, and Ledford (1999) conceded that "the promise of SMWT may be oversold in the literature" (p. 359). In the wake of such uneven success, SMWT proponents are now acknowledging how certain conditions, such as groupthink or directive leadership, can threaten team productivity or viability (Alper, Tjosvold, & Law, 1998; Kirkman & Shapiro, 2001; Moorhead et al., 1998). At the same time, prescriptions for overcoming roadblocks to team performance proliferate (Katzenbach & Smith, 1993; Manz & Sims, 2001), though most practitioner suggestions are speculative and lack empirical grounding (Moravec, 1999).

2. Revisiting a theoretical foundation of SMWT performance: Individual self-management

We explore conditions when SMWT succeed or fail to live up to expectations by studying how and when team participants' self-regulatory strategies underpin collective effectiveness. Various SMWT frameworks (Cohen, Ledford, & Spreitzer, 1996; Manz & Sims, 1987; Neck & Houghton, 2006) contend that team members who adroitly manage self-processes advance collaborative endeavors. In particular, Manz and colleagues (Houghton, Neck, & Manz, 2003; Manz & Sims, 1987, 2001; Neck & Manz, 2007) maintained that self-regulating teammates effectively complete their own tasks as well as team tasks. When individuals display more self-discipline over their behavior, build intrinsic motivation (by acting autonomously and assuming ownership for collective outcomes; Deci, 1975; Druskat & Wheeler, 2003; Hackman, 1987), and mentally cope with frustrations and setbacks (Kanfer & Heggestad, 1997), personal and team performance both improve.

Despite its centrality in SMWT formulations, self-management does not invariably facilitate team functioning according to research on self-management leadership (SML, leaders encouraging team-generated controls; Manz & Sims, 1987), team self-management (TSM, teams self-regulating group processes; Wageman, 2001), and individual self-management (ISM, team members self-managing themselves; Uhl-Bien & Graen, 1998). To illustrate, SMWT studies uncovered mixed findings that SML underlies team success (Cohen et al., 1996; Cohen, Chang, & Ledford, 1997; Manz & Sims, 1987; Spreitzer et al., 1999; Wageman, 2001). Similarly, other inquiries showed that TSM promotes SMWT performance (Kirkman & Rosen, 1999; Mathieu, Gilson, & Ruddy, 2006; Wageman, 2001) but not the performance of retail store teams (Chen, Kirkman, Kanfer, & Allen, 2005), manufacturing teams (Stewart & Barrick, 2000), and construction road crews (Tesluk & Mathieu, 1999). Further, investigations of traditionally managed work groups observed that average ISM levels within teams (or team-mean ISM, another self-management construct) inconsistently improve collective effectiveness (Langfred, 2000; Uhl-Bien & Graen, 1998). Given such equivocal results, identifying how and when self-management augments team effectiveness is imperative (Morgeson, 2005; Pearce & Manz, 2005; Wageman, 2001). From a practical standpoint, delineating such contingencies can help set the stage for SMWT success.

This project extends SMWT research in several ways. Specifically, we assess a broader array of self-influence strategies identified by contemporary self-leadership perspectives (Houghton & Neck, 2002; Manz, 1986; Neck & Manz, 2007). Past explorations of a limited set of strategies likely underestimated their benefits (Cohen et al., 1997; Manz & Sims, 1987). Moreover, we examine collective ISM constructs—namely, average ISM levels within teams and team networks—derived from team-member traits (Barrick, Stewart, Neubert, & Mount, 1998). Through composition processes, team participants' self-regulating actions may collectively emerge as isomorphic ISM constructs at team and MTS levels (Chen, Bliese, & Mathieu, 2005; Kozlowski & Klein, 2000). Previous SMWT work has scrutinized SML (Cohen et al., 1996, 1997; Manz & Sims, 1987) and TSM (Kirkman & Rosen, 1999; Wageman, 2001) but not collective ISM constructs, though the latter have been shown to impact traditionally managed groups (Langfred, 2000; Uhl-Bien & Graen, 1998). Exploring a "homologous multilevel model" (Kozlowski & Klein, 2000), we investigate average ISM levels within self-managing teams and multi-team systems in a semiconductor plant. By so doing, our study thus generalizes MTS research beyond simulated laboratory and R & D teams (DeChurch & Marks, 2006; Hoegl, Weinkauf, & Gemuenden, 2004; Marks, DeChurch, Mathieu, Panzer, & Alonso, 2005) and validates a basic but untested premise that aggregate-level ISM enhances functioning of SMWT collectivities (Manz & Sims, 2001). Further, we heed Kozlowski and Bell's (2003) call for further efforts to map the boundary conditions for team self-management by probing how team cohesion moderates self-management effects (Morgeson, 2005; Wageman, 2001). All told, we evaluate a model of how collective ISM influences MTS performance depicted in Fig. 1. Below, we furnish theoretical and empirical evidence for a broader and emergent MTS ISM construct and its direct and interactive effects on productivity of empowered team collectives.

2.1. Self-leadership: Extending traditional views of self-management strategies

Drawing from social learning and behavioral modification theories (Luthans & Kreitner, 1985; Manz & Sims, 1980), early SMWT thinkers conceived how team members exert self-control by manipulating environmental antecedents and consequences of behavior (Cohen et al., 1997; Manz & Sims, 1987; Uhl-Bien & Graen, 1998). Specifically, they delineated various "behavior-focused" strategies, by which individuals manage their behaviors (e.g., self-goal setting and self-reinforcement) to complete necessary—but often unpleasant—tasks (Neck & Houghton, 2006). Manz and associates (Houghton et al., 2003; Manz, 1986; Manz & Sims, 2001) later argued that individuals can also use "natural reward strategies" (Neck & Houghton, 2006) to motivate themselves by noticing or embedding intrinsic rewards into their work. For example, nurses can appreciate mundane tasks, such as bathing patients, by realizing how such tasks promote patient comfort and health (Gagné & Deci, 2005). They further prescribed "thought self-leadership" as a means by which people can shape their own thoughts (Manz & Neck, 2004; Neck & Manz, 1996). That is, employees can use positive self-talk, visual imagery of performance executions, and rational counterarguments to

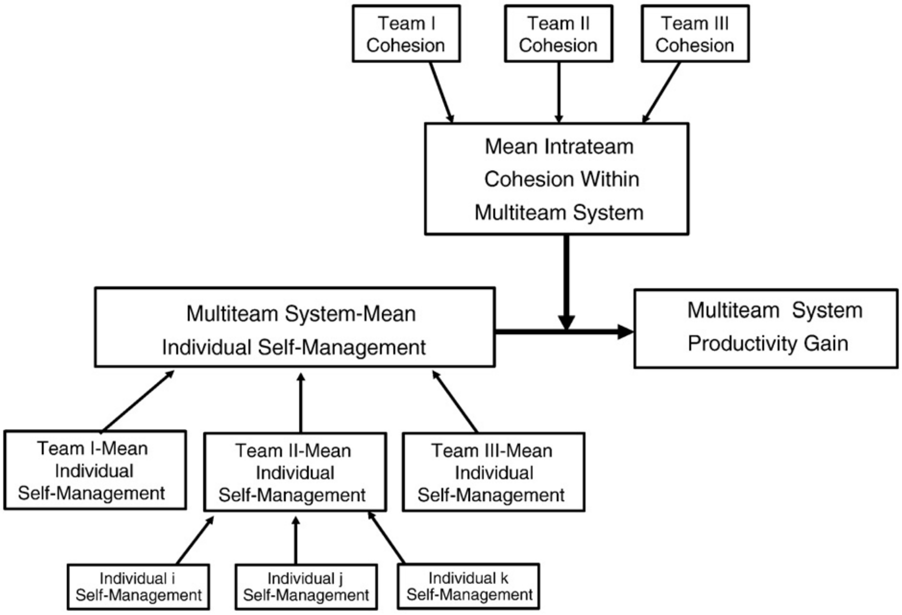

Fig. 1. Model of direct and interactive effects of individual self-management competencies on MTS productivity.

dysfunctional beliefs to enhance self-efficacy and effectiveness through goal difficulty and diligent effort (Stajkovic & Luthans, 1998) (Fig. 2).

Other theory and research sustain Manz's (1986) broader portfolio of self-leadership methods, affirming how effective performers often deploy natural reward strategies. Attesting to their viability, Ilgen and Hollenback (1991) asserted that most employees can intrinsically enrich work activities because virtually all jobs comprise “emergent” tasks that they can redefine.

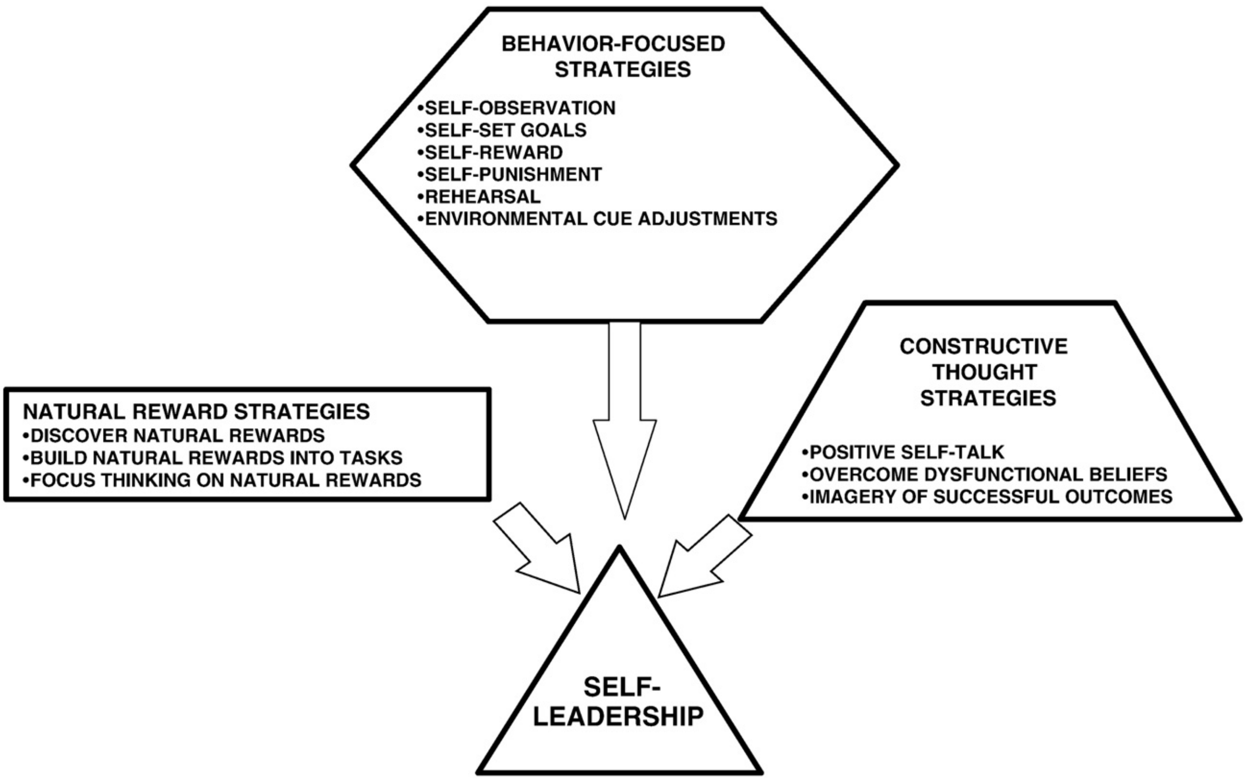

Fig. 2. Self-leadership framework.

Wrzesniewski and Dutton (2001) corroborated this view, observing that certain menial laborers proactively "craft" uplifting occupational identities by enlarging duties and injecting meaning into their work. Similarly, scholarly work on the proactive personality and personal initiative endorse this self-motivational strategy, revealing that self-starting, persistent, and action-oriented people spontaneously create or mold situations in which they work to intrinsically motivate themselves for higher performance (Frese & Fay, 2001; Seibert, Crant, & Kraimer, 1999). Further, Stewart, Carson, and Cardy (1996) documented that employees instructed on ways to create intrinsic motivation become more self-directed.

Other theoretical perspectives and findings also add credence to constructive thinking strategies identified by Manz and his colleagues (Manz, 1986; Manz & Sims, 2001). Drawing from Kuhl (1985), Kanfer and Heggestad (1997) deduced "emotional control" (minimizing worry and distracting thoughts) and "motivational control" (reinforcing persistence) as forms of cognitive restructuring. In support, Seligman and Schulman (1986) reported that insurance agents inclined toward optimistic explanatory styles stay in jobs longer and sell more policies than pessimists, while Prussia, Anderson, and Manz (1998) discerned that college students who habitually look on the positive side of things achieve higher grades. In the same vein, Parsons, Herold, and Leatherwood (1985) discovered that incoming hotel room cleaners attributing performance to effort rather than luck remain longer, while Judge and Locke (1993) and Wanberg and Kammeyer-Mueller (2000) recounted how employees resisting irrational thoughts feel more favorably about their job. Finally, controlled experiments upgrading inner dialogues have increased student teams' performance (Brown, 2003), reemployment of displaced managers (Millman & Latham, 2001), employee morale in a bankrupted firm (Neck & Manz, 1996), and trainee confidence for learning complex skills (Kanfer & Ackerman, 1996). In light of such evidence for natural reward and constructive thinking strategies (Griffeth, 1985; Wanberg & Kammeyer-Meuller, 2000), this inquiry assesses these newer methods in addition to behavior-focused strategies to fully gauge self-management effects on MTS performance.

2.2. Collective constructs based on individual self-management

Though commonly assuming that "self-leading individuals are the basic building blocks of a self-leading team" (Neck, Stewart, & Manz, 1996; p. 57), SMWT scholars neglect to clarify and examine how individual self-management emerges as collective constructs. To address this oversight, we theorize that collective ISM constructs have similar functions (promoting performance) at team and MTS levels as does individual-level ISM, presuming similar but not necessarily identical homologous meaning (Chen & Bliese, 2002; Morgeson & Hofmann, 1999). In particular, we determine whether a higher-level MTS ISM construct—derived from doubly aggregating team-member ISM scores within teams (team-mean ISM) and within multi-team collectives (MTS-mean ISM)—can enhance effectiveness of MTS collectives of empowered teams. In what follows, we initially discuss how a team ISM construct—based on additively combining individual ISM scores representing team-member attributes that are not necessarily consistent across members ("additive composition"; Chan, 1998)—facilitates team functioning. We then deduce an MTS-level construct from these "building blocks" to explain how this multilevel ISM construct can promote MTS effectiveness.

2.2.1. Team-mean ISM

Following Langfred (2004) and Uhl-Bien and Graen (1998), we envision team-mean ISM (collective self-management capabilities within a team) as a team-composition variable (Barrick et al., 1998). Self-management theory (Kanfer & Heggestad, 1997; Manz & Neck, 2004) and research (Frayne & Geringer, 2000; Wanberg, Rotundo, & Kanfer, 2001) suggest that team-mean ISM may increase team performance like other ability and dispositional traits combined into team-level constructs (e.g., mean intelligence and conscientiousness; Barrick et al., 1998; Kozlowski & Bell, 2003). Specifically, self-managing participants perform their own duties well (Frayne & Latham, 1987; Frese & Geringer, 2000) and seldom drain away others' productive time by soliciting their help to finish tasks (Frese & Fay, 2001; Kanfer & Heggestad, 1997; Porter et al., 2003). As a result, teams comprising self-starters should perform more effectively than teams populated by less self-reliant members. Supporting this proposition, prevailing human resources management models hold that individual team-member performance summates into greater team effectiveness (Ployhart, 2004), while Chen, Kirkman, Kanfer, Allen, and Rosen (2007) found that high average individual performance within freight teams translates into superior overall team performance.

Apart from regular "task work" (Kozlowski & Bell, 2003), self-regulating team members may readily fulfill team responsibilities that are indispensable for SMWT functioning. Because of greater self-efficacy (Latham & Frayne, 1989; Neck & Manz, 2007) and conscientiousness (Houghton, Bonham, Neck, & Singh, 2004), competent self-managers may dutifully discharge leadership roles (e.g., mentoring and motivating; Houghton et al., 2003), teamwork requirements (e.g., synchronizing activities with others, monitoring team progress; Kozlowski & Bell, 2003; Morgeson, Reider, & Campion, 2005), and cross-training obligations (Kirkman & Rosen, 1999). In support, Tasa, Taggar, and Seijts (2007) determined that self-efficacious members in self-directed teams more frequently perform teamwork, such as formulating strategies to achieve team goals and managing conflicts among members. Because "team members must first learn to lead themselves before they can effectively influence and lead their fellow team members" (Houghton et al., 2003, p. 132), a collection of self-starting members can better carry out the varied nontraditional functions vital for effective empowered teams.

Further, self-regulating members maintain higher self-efficacy beliefs (due to constructive thinking; Neck & Manz, 1992, 1996) which can evolve into collective confidence about a team's abilities (Gully, Incalcaterra, Joshi, & Beaubien, 2002) and thereby reinforce team motivation (Gibson, 1999; Kozlowski & Bell, 2003). Individual self-efficacy can coalesce into higher team efficacy when team participants experience empowering leadership climates and self-confident role models (Chen et al., 2007), conditions more common in SMWT than traditional teams (Manz & Sims, 2001). More than this, SMWT participants feel more confident about team capability when they see their peers engaging in teamwork, such as managing team deadlines and collaboratively problem-solving, and thus learn about their teamwork competencies and devotion to team endeavors (Tasa et al., 2007). Finally, teams populated by self-regulators are less prone to groupthink (and defective decision-making) for they more freely express divergent views (Moorhead et al., 1998). Supporting this line of reasoning, Langfred (2000) documented that the mean level of individual soldiers' autonomy boosts infantry squad performance. Chen and associates (2007) demonstrated that individual empowerment enhances member performance that in aggregate bolsters team performance. In addition, Uhl-Bien and Graen (1998) showed that team-mean ISM enables functional teams of professionals to perform better. All told, we contend that SMWT comprising highly self-managing individuals may outperform teams whose members are less self-leading on the whole.

2.2.2. MTS-mean ISM

We believe that collective ISM should be homologous across team and MTS levels because MTS are "teams of teams" (DeChurch & Marks, 2006). That is, self-management builds human capital (Frayne & Latham, 1987; Frayne & Geringer, 2000), and the accumulation of such (ISM) capital within larger systems should in turn facilitate MTS performance. Demonstrations that aggregated human capital within firms predicts corporate performance lend indirect support for our thesis. To illustrate, Hitt, Bierman, Shimizu, and Kochhar (2001) established that law firms employing more experienced partners with prestigious law degrees generate more client revenues as they possess more knowledge and social capital. Similarly, Smith, Collins, and Clark (2005) reported that high tech firms whose top managers and knowledge workers completed more education generate more new products and services. Extending the preceding logic that collections of self-regulating individuals are more efficacious teams, we likewise contend that multi-team networks comprising self-regulating teams (as indexed by a mean of team-mean ISM scores within MTS collectives) perform better. Quite likely, component teams comprising self-managers carry out team tasks more reliably (with little supervisory oversight) and "back up" other teams, thereby supporting the broader mission of the larger systems in which they are nested (Porter et al., 2003; Wageman, 2001).

Beyond this, multi-team collectives consisting of self-confident teams likely formulate higher efficacy beliefs about their MTS competencies, which might foster system-wide productivity (Kozlowski & Bell, 2003). Given complex responsibilities for managing multiple teams (such as cross-team coordination; DeChurch & Marks, 2006), MTS leaders more likely share authority with teams and promulgate stronger empowerment climates within MTS, especially when subunits themselves are self-managing teams. Just as team leaders can invoke shared team efficacy among followers via leadership climates (Chen & Bliese, 2002; Chen et al., 2007), empowering leadership climates by multi-team leaders may also induce self-managing teams to adopt collective beliefs that their MTS can muster whatever it takes to succeed. Based on the foregoing theory and research about performance advantages of collective ISM at team and MTS levels, we accordingly submit the following:

Hypothesis 1. Multi-team system-mean individual self-management scores are positively related to MTS performance.

2.3. Moderating collective ISM effects by MTS intra-team cohesion

We also argue that team cohesion moderates the effects of ISM collective constructs. Specifically, we first clarify how social cohesiveness among team members can augment the positive effects of team-level ISM on SWMT performance. We then clarify how team cohesion advantages MTS collectives by increasing the productivity-enhancing impact of MTS-level ISM.

2.3.1. Cohesion within self-managing teams

While long contemplating how interpersonal cohesion impacts self-managing team functioning (Manz & Neck; 1997; Moorhead et al., 1998), few scholars have tested how team cohesion moderates the influence of member self-regulation (cf. Langfred, 2004). Indeed, social cohesion may underlie why self-management variably affects team performance (Cohen et al., 1996, 1997; Spreitzer et al., 1999). Quite likely, attraction among members reinforces the motivational benefits of member self-influence, whereas team disunity and discord can undermine those effects. Several perspectives specify that affective bonding moderates self-management influence on empowered team effectiveness via effort direction, intensity, and coordination and helping (Dirks, 1999; Uhl-Bien & Graen, 1992).

In particular, cohesion focuses team participants' efforts on shared superordinate objectives. Cohesion studies (Beal, Cohen, Burke, & McLendon, 2003; Bishop & Scott, 2000) and collectivistic motivation frameworks (Kidwell & Bennett, 1993; Shamir, 1990; Sheppard, 1993) indicate that cohesion induces members to commit to team goals. Preventing members from neglecting collective goals is an ongoing challenge for all teams (DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004), especially for self-reliant and autonomous members. Members acting as their own bosses may pursue their self-interests at the expense of the team's good because "effective self-managers may be so intent on performing on their own that they are not able to work effectively in an integrative setting with others" (Uhl-Bien & Graen, 1992, p. 233). Attesting to how member disunity lessens devotion to superordinate goals, Uhl-Bien and Graen (1998) found that cross-functional teams including highly self-managing professionals perform poorly, while Podsakoff, MacKenzie, and Ahearne (1997) discerned that discord in paper mill work crews and insurance agencies weakens member acceptance of group goals.

Aside from channeling effort, team cohesion encourages self-managers to work harder for collective pursuits according to trust scholars (Dirks, 1999; Williams, 2001). Williams (2001) noted that "affective attachments form the basis for caring and benevolent actions that build trust" (p. 379) and that "demonstrations of trust in others is one way…to build and maintain social relationships" (p. 387). Because trust reflects (and underpins) cohesiveness (Chandsler, Swamidass, & Cammann, 2003;

Ivancevich & McMahon, 1976; Langfred, 2004; Montanari & Moorhead, 1989), individuals who trust their teammates may more fully apply their resources and energies toward the group's task as they believe that teammates will not take advantage of them or let them down (Dirks, 1999). By contrast, distrust—and disunity—detracts team participants' attention away from "achieving the group outcome as he or she attempts to 'protect their backside' by monitoring others' actions" (Dirks, 1999; p. 448). Bearing out this notion, Bennett and Kidwell (2001) theorized that emotional bonding among members mobilizes more effort toward collaborative projects, while Stewart and Barrick (2000) detected that intra-team conflict positively (and strongly) covaries with member shirking.

More than this, interpersonal bonds strengthen joint action among self-managers (Mullen & Copper, 1994). Social cohesion in empowered teams offsets coordination errors and process losses due to extreme individual self-management (Langfred, 2004; Uhl-Bien & Graen, 1992). After all, "effective teamwork requires both the fulfillment of one's own role as well as coordination with others" (Hofmann & Jones, 2005; p. 520). Accordingly, self-regulating members who like one another and want to stay together likely harmoniously combine their actions as they can depend on their partners and predict their actions (Dirks, 1999). Finally, attraction between self-reliant teammates motivates helping and back-up behaviors for teammates expect that those they like and trust would reciprocate in kind (Dirks, 1999). This contentions fit with Williams' (2001) trust model that positive affect for co-workers inspires cooperative acts by fueling desires for ongoing relationships and social rewards associated with cooperative tasks. Alper and colleagues (1998) also observed that cooperative interdependence (where members must cooperate to reach personal goals)—a basis for affective attachment and trust (Williams, 2001)—augments team performance more than does competitive interdependence (where members compete to attain their goals).

2.3.2. Intra-team cohesion in MTS collectives

Extrapolating to the MTS level, we further reason that MTS networks comprising teams of emotionally bonded self-managers should outperform multi-team networks comprising less cohesive teams of self-managers. In our study in semiconductor manufacturing, cross-team cohesion has limited utility for meeting MTS objectives. Though serially collaborating to process wafers across shifts, component teams in wafer-fabrication systems often start and finish their own wafer batches (see Fig. 3). More crucial is how well component teams perform internal teamwork to meet their proximal goals—and by extension, how cohesive (high self-managing) members are within teams—because wafer-fabrication MTS success primarily depends on the summated production of component teams and, to a lesser extent, between-team production (J. Hall, personal communication, August 18, 2005). In short, we take the position that average intra-team cohesion in multi-team systems (not inter-team cohesion) moderates MTS self-management effects. In essence, we adopt an additive composition model for aggregating intra-team cohesion scores into MTS scores because independently operating teams within MTS are not necessarily alike in cohesiveness (Chan, 1998). Upholding our view, Marks and associates (2005) reported that successful execution of within-team action processes by simulated flight teams most enhances MTS performance when teams operate under less (pooled or serially linked team goals) rather than more interdependent (intensively linked team goals) goal hierarchies.

Because component teams perform best when members are both self-reliant and bonded to one another, MTS comprising such teams should outperform MTS whose teams are divisive or lack competent self-managers (or both). Buttressing this thought, Hoegl and associates (2004) found that "teamwork quality," a composite consisting of team cohesion, mutual support, and within-team collaboration, helps multi-team R & D projects by expanding component teams' ability finish their design work on time and within budget, inter-team coordination, and shared commitment to project goals. Consequently, we postulate that high MTS-mean ISM is most conducive to MTS performance when teams within MTS collectives are cohesive (displaying intra-team cohesion) than when they are discordant, and evaluate the following:

Hypothesis 2. Within-team cohesion moderates the positive relationship between multi-team system-mean individual self-management and MTS productivity, such that this relationship is stronger when MTS collectives consist of cohesive teams.

3. Method

3.1. Semiconductor multi-team systems

We surveyed 97 empowered teams from a domestic plant owned by an American multinational semiconductor corporation. Teams were clustered into 21 MTS ("modules") representing all phases in silicon wafer manufacture. The final devices perform different electronic functions, but all silicon wafers were produced in the same way. As Fig. 3 portrays, modules represent different stages (e.g., photolithography [imprint circuitry onto wafers] and etching [remove unwanted materials from wafers]) in wafer production. Small boxes depict separate teams, which are enclosed by larger bold-faced boxes representing modules. Wafers are manufactured around the clock. Each module includes multiple teams (on four shifts) that work independently as well as finish work started by earlier shifts. These modules represent MTS in conformity to Mathieu et al.'s (2001) three forms of functional interdependence (multi-team interdependence): outcome (vested interest in superordinate goals by component teams); process (inter-team interaction needed for goal accomplishment); and input (component teams share facilities, equipment, supervision, information, and environmental constraints) interdependence.

Outcome interdependence exists within each module because component teams are collectively responsible for achieving module productivity and quality goals, receive regular feedback on progress toward MTS goals (pinpointing team and individual sources of delay or defects), and earn recognition for module performance. Team goals are not hierarchically nested within

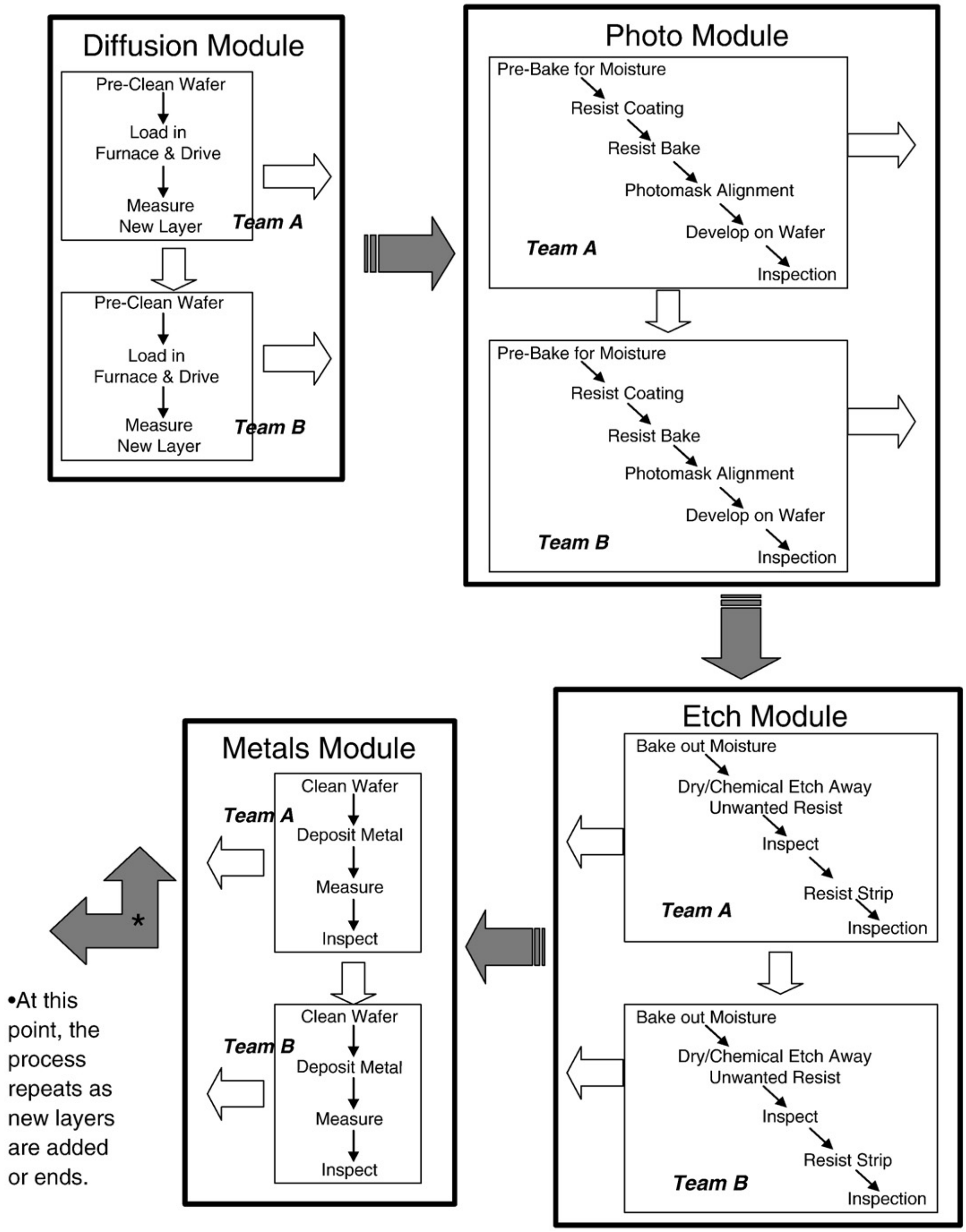

Fig. 3. Wafer-fabrication process (each module typically contains four teams of which two are illustrated).

modules (Mathieu et al., 2001), but SMWT must maximize production subgoals within and between teams (i.e., two teams have horizontally aligned subgoals when they sequentially complete wafer processing across shifts) to reach the module's production goal (J. Hall, personal correspondence, August 18, 2005). In short, horizontally aligned and additive subgoals of component teams contribute to the larger system goal (DeChurch & Marks, 2006), inducing integration and coordination across teams (Mathieu et al., 2001). Moreover, modules exhibit process interdependence because teams on different shifts are sequentially interdependent (unidirectional work flow between teams). That is, teams often complete processing wafer batches started on prior shifts as well as begin new batches for later shifts to finish (shown as vertical arrows between small boxes in Fig. 3). Indeed, special wafers require longer time in diffusion furnaces to embed deeper layers for certain electronic specifications and thus cannot be processed during a single shift (K. Kozik, personal correspondence, July 20, 2006). Nonetheless, module work is also characterized by pooled interdependence (aggregating component team efforts) because teams fully process their own wafer batches during their shift (horizontal arrows from team boxes in Fig. 3). As a result, module production comprises the sum of solo wafer output of separate teams and overlapping output of multiple teams across shifts. Finally, teams within modules have input interdependence for they utilize the same room, tools, supplies, supervision, instructions, and safety and environmental controls. In sum, wafer-fabrication modules constitute collections of functionally interdependent teams based on Mathieu et al.'s (2001) MTS criteria.

Within teams, individual participants staff different work stations (or manufacturing substages) to process wafers (personal correspondence, K. Kozlik, July 20, 2006). Six steps are followed in photolithography, for example. First, an operator pre-bakes a wafer to remove any moisture, while another operator coats the wafer with "photoresist" chemicals. In the next step, an operator bakes the wafer. Another operator then aligns a photomask of the layer of the desired circuit onto the coated wafer, while another operator later develops an image of the circuitry onto the wafer. The last operator in this module inspects the imprinted wafer against specific requirements. Given cross-training, individual members often help out (or relieve) others at different work stations to ensure that several wafer batches concurrently move through the multi-step process during their shift. Though involving a sequential work flow (Saavedra, Earley, & Van Dyne, 1993; Van de Ven & Ferry, 1980), team tasks do not resemble traditional assembly lines (where a member must act before another can act). Multiple stations at some substages (e.g., photomasking) concurrently handle wafer batches (i.e., wafer inspection continues even if a particular photomask operator did not finish work on another batch in process) and several members collaborate at stations facing bottlenecks (due to wafer volume or equipment constraints). Besides sequential operations, team participants simultaneously collaborate on tasks ("team interdependence," Saavedra et al., 1993), such as planning the work schedule, assigning staff to work stations (depending upon workflow and team assessment of daily needs), and solving problems (J. Hall, personal correspondence, August 18, 2005).

The focal organization introduced empowered teams three years before the survey. Senior executives expressed strong commitment toward implementing manufacturing SMWT. This transition was sustained by the company's long history of people development and philosophy of "respect for the individual" and "uncompromising integrity." Following Orsburn, Moran, Musselwhite, and Zenger's (1990) roadmap on how to migrate teams towards greater self-management, the human resources management department extensively trained supervisors and teams in teamwork, problem-solving, and communication skills. To strengthen teamwork, teams also received collective financial rewards.

3.2. Study participants

From a population of 744 workers, 722 members completed a survey describing individual self-management and team cohesiveness. We deleted six respondents who failed to identify their team, leaving an effective N of 716. Teams averaged 8.04 members, and modules averaged 4.23 teams (one team per shift). Sixty-two percent were women, while 54% were Caucasian. Thirty-two percent exceeded 46 years of age, and 51.1% worked 10 or more years.

3.3. Measurement of theoretical constructs

3.3.1. Individual self-management

We adapted Manz' (1992) 90-item measure to assess varied self-regulating methods depicted in his framework. Manz (1992) expanded the Manz and Sims' (1987) measure of self-managing behaviors (e.g., self-goal setting) to assess additional self-management strategies (e.g., cognitive restructuring). Cohen et al. (1997) validated the factor structure of the Manz–Sims 1987 scale across team members and leaders and across SMWT and traditional groups. Anderson and Prussia (1997) later showed that two groups of judges agreed on 67% of the categorizations of these items into one of three self-management strategies (behavioral focused, natural reward, and constructive thinking), while Prussia et al. (1998) affirmed the predictive validity of Manz' (1992) self-management scales for academic success. For scale reduction, we administered Manz's 1992 scale to 200 college students and factor analyzed their responses. Based on oblique rotation, the resulting factor structure revealed 15 factors, many corresponding to Manz' (1992) framework (e.g., opportunity thinking, self-reward, and job expansion) and resembled factor analytical findings from Anderson and Prussia's (1997) survey of college students. To shorten the survey (administered during work hours), we chose 50 items with the largest factor loading, editing them for readability.

Exploratory factor analysis of survey responses with wafer assembly workers revealed nine factors with eigenvalues exceeding 1.0. Appendix A reports factor loadings for retained items (those loading on only one factor), omitting multifactor items or items with poor factor loadings. Several factors represented behavior-focused strategies—namely, self-observation/self-goal-setting ("I pay attention to how well I am doing my work," "I set specific goals for my own performance"), rehearsal ("I go over in my mind my plans for completing tasks before I actually do them"), reminders ("I use actual reminders to help me focus on things I need to accomplish"), and self-reliant problem-solving ("I think up ways to solve problems before I ask others for help"). Another set of factors captured natural reward strategies: self-job-enrichment ("I look for activities that I can do that go beyond normal duties") and creating self-motivating situations ("I try to include tasks into my work that I like doing"). Constructive thinking strategies were represented by self-expectation ("I make clear images in my mind of seeing myself successfully performing tasks"), self-talk ("I sometimes try to describe out loud my vision of successfully doing tasks"), and opportunity thinking ("I act on the benefits of opportunities, even if I face some significant obstacles"). We created scales pooling items with the largest factor loadings. These scales possessed satisfactory reliabilities ranging from 0.66 to 0.80 (M $\alpha = 0.76$) and adequate discriminant validity (scale M $r = 0.51$).

3.3.2. Team cohesion

We used Montanari and Moorhead's (1989) four questions to measure perceived friendliness, trust, and loyalty among co-workers (e.g., "How much loyalty and sense of belonging is there among team members?"; $\alpha = 0.85$).

3.3.3. Productivity gain

Most SMWT research relied on subjective team evaluations (Alper et al., 1998; Bishop, Scott, & Burroughs, 2000; Cohen & Ledford, 1994; Cohen et al., 1997; Erez, Lepine, & Elms, 2002), but we collected an objective index: a module's wafer output (defect-free) per direct labor hour. Because wafer processing is completed over multiple shifts within a module (i.e., teams continue and finish the work of teams on prior shifts), this organization views module productivity (counting wafer volume for all teams in a module) as a more meaningful index than team productivity (due to difficulty identifying each team's separate output; J. Hall, personal communication, August 18, 2005). To account for initial module technologically-based productivity differences, we assessed module productivity during and before survey administration and computed productivity gain by dividing the most recent three months of production data by three months of data collected a year earlier. This ratio resembles an efficiency measure by taking into account group inputs (such as past production) relative to outputs and is more informative of collective performance than is an effectiveness measure (Beal et al., 2003). Beal et al.'s (2003) meta-analysis finds that group research often employs efficiency indices to assess group performance.

3.4. Data aggregation

Given our focus on module productivity and its antecedents, we performed all statistical tests at the module level. We doubly aggregated individual self-management scores—first by team and then by module—because teams and modules performed additive tasks (Barrick et al., 1998). This MTS-mean ISM score is based on an additive composition model allowing for lower-level unit divergence (Chan, 1998). This model assumes that the amount of self-management shown by each member (or team) increases the collective pool of that competency for the team (or module) (cf. Tasa et al., 2007). Additive composition does not imply that all members are highly self-regulating but only that a collectivity includes some high self-regulators who can raise the collective's average ISM score (Tasa et al., 2007). Individual members may thus have different ISM scores within teams and different teams may have different team-mean ISM scores within modules (cf. Langfred, 2000). Aggregated ISM scores thus is not a homogeneous construct because neither members in teams nor teams in modules were selected or trained to have similar self-management strategies (cf. DeShon et al., 2004).

We computed intra-class correlations (ICCs) to assess reliability of team-mean and module-mean ISM scores (cf. Tasa et al., 2007). ICC1 indicates amount of individual ISM variance due to group membership, while ICC2 represents reliability of group-level means (Bliese, 2000). Team-level analyses revealed that the mean ICC1 score across the nine self-management scales (using Bliese & Halverson's, 1998, correction) was 0.027 and that the mean ICC2 score was 0.169 (suggesting less reliable team-mean ISM scores). ICC1 and ICC2 scores (averaged across all self-management dimensions) for module means however were 0.165 and 0.425, respectively, suggesting greater reliability for MTS-mean ISM scores.

To represent mean intra-team cohesiveness in modules, we also doubly aggregated cohesion scores—first averaging individual scores by team and then averaging team means by module. We expected a direct consensus model to describe team averages as members described cohesiveness within their team (referent content is the team) and individual perceptions should evince some agreement about this team property (Chan, 1998). By contrast, an additive model better fits module means because teams function relatively independently of each other, processing their own wafer batches on different shifts. SMWT within modules would not necessarily bond with each other nor have similar (team) cohesiveness levels (i.e., cohesive teams are not necessarily homogenous within MTS). The team cohesion ICC1 of 0.23 exceeded the 0.12 reported by James (1982) and fell within the range of acceptable values in recent aggregation tests (Chen & Bliese, 2002; Hofmann & Jones, 2005), while its ICC2 of 0.70 indicated high reliability (Schneider, White, & Paul, 1998). Further, its average r_{wg} was 0.79 (James, Demaree, & Wolf, 1984, 1993), exceeding the common 0.70 threshold (Tasa et al., 2007). On the whole, these statistics support a direct consensus model for mean individual cohesion scores within teams. Though r_{wg} was 0.89, MTS cohesion ICC1 (0.07) and ICC2 (0.26) scores were lower, which suggest that an additive composition model underlies MTS cohesion scores (the average of a module's within-team cohesion scores).

3.5. Statistical analyses

Given limited degrees of freedom based on 21 modules, we calculated bivariate correlations to test Hypothesis 1 and interpreted one-tailed significance tests for this directional hypothesis. Likewise, Brown (2003) and Hoegl et al. (2004) used an α level of 0.10 for testing hypotheses with 41 teams and 39 teams, respectively. We ran moderated regression to test Hypothesis 2, using a composite index combining all self-management scales due to their moderate to high intercorrelations (see Table 1) (indicating that people commonly apply multiple self-leadership strategies to accomplish goals; Anderson & Prussia, 1997). This composite index conforms with Houghton and Neck's (2002) confirmatory factor analysis that found that a second-order factor explains first-order factors representing self-leadership strategies.

4. Results

We correlated module self-management strategies with module productivity improvements. Table 1 depicts correlations among variables. Only self-job-enrichment ($p<0.05$), positive self-talk ($p<0.10$), and opportunity thinking ($p<0.10$) positively predicted productivity gain, partially supporting Hypothesis 1.

Testing cohesion's interactive effect, Table 2 shows results of a hierarchical moderated regression analysis. After including intra-team cohesion, the self-management composite, and module team size in Step 1, we entered the product term between cohesion and self-management composite index in Step 2. Conforming to Hypothesis 2, the cohesion × self-management interaction explained 20% of the variance ($p<0.05$), a substantial moderator effect according to McClelland and Judd (1993). To

Table 1
Module-level correlations among self-management scales, intra-team cohesion, and productivity gain.

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Self-expectations	–										
2. Reminders	0.70**	–									
3. Self-observations/goal-setting	0.74**	0.64**	–								
4. Self-job-enrichment	0.58**	0.47**	0.67**	–							
5. Problem-solving	0.60**	0.37**	0.62**	0.85**	–						
6. Self-motivation	0.84**	0.61**	0.72**	0.72**	0.80**	–					
7. Rehearsal	0.79**	0.64**	0.79**	0.49**	0.53**	0.70**	–				
8. Self-talk	0.85**	0.60**	0.68**	0.76**	0.75**	0.93**	0.65**	–			
9. Opportunity-thinking	0.70**	0.53**	0.65**	0.79**	0.80**	0.80**	0.63**	0.87**	–		
10. Mean intra-team cohesion within module	0.21	0.15	0.20	0.37**	0.48**	0.34*	0.23	0.37**	0.47**	–	
11. Mean self-management score by module	0.89**	0.72**	0.83**	0.83**	0.82**	0.94**	0.80**	0.94**	0.89**	0.37**	–
12. Module productivity gain	0.23	0.17	0.07	0.35**	0.20	0.15	0.12	0.34*	0.32*	0.29*	0.26

* $p \leq 0.10$, one-tail test.
** $p \leq 0.05$, one-tail test.

interpret this interaction, we plotted four groups (inputting predictor scores one SD above or below the means in the moderated regression equation) for all combinations of high and low self-management and intra-team cohesion in Fig. 4. Verifying Hypothesis 2, tests of simple slopes disclosed that self-management increased productivity gain for modules comprising cohesive SMWT ($t = 1.84$, $df = 16$, $p < 0.05$) but not for modules with less cohesive SMWT ($t = -1.18$, $p > 0.05$; Aiken & West, 1991).

In summary, we demonstrated that a collective ISM construct increased the productivity of multi-team systems. MTS collectives comprising teams practicing self-job-enrichment and constructive thinking were more productive. We also found a strong moderating effect by intra-team cohesion. Intra-team cohesion within MTS enhanced performance gains of collective ISM.

5. Discussion

The present investigation advances scholarly and popular understanding of how self-management enhances SMWT collectivities in several ways. First, the current results go beyond previous SMWT work on self-management by considering a broader set of self-influence strategies promulgated by modern self-leadership formulations (Kanfer & Heggestad, 1997; Manz & Neck, 2004). Earlier work examined traditional strategies to self-manage behavior and the environment (Cohen et al., 1997; Manz & Sims, 1987). We extended that line of inquiry by considering self-redesign of tasks and thought self-leadership (Neck & Houghton, 2006; Pearce & Manz, 2005). The current research indicates that intrinsic motivation via self-initiated task redesign can enhance collective effectiveness, though finding weaker effects for self-control over thoughts and self-statements. Our findings add to the sparse guidelines on what external leaders can do to best support self-managing teams (Druskat & Wheeler, 2003). Accordingly, leaders or facilitators seeking to improve SMWT functioning should instruct team participants on how to overcome dysfunctional thought patterns (Brown, 2003; Neck & Manz, 1996) and enrich tasks (Stewart et al., 1996) so they can experience more collective potency and purposeful work (Kirkman & Rosen, 1999).

Table 2
Moderated multiple regression analysis predicting productivity gain from self-management composite score, module intra-team cohesion, and their interaction.

Predictors	Step 1			Step 2		
	Unstandardized regression coefficients	F	df	Unstandardized regression coefficients	F	df
Constant	1.04*			0.99*		
Average intra-team cohesion within module	0.13			0.11		
Self-management composite index	0.11			0.02		
Number of teams within module	0.01			0.01		
Self-management × module intra-team Cohesion interaction				0.84*		
R^2	0.12	0.80	(3,17)	0.32	1.91	(4,16)
ΔR^2				0.20	4.73*	(1,16)

Note. To minimize multicollinearity, we centered module intra-team cohesion and self-management composite index before creating the interaction term (Aiken & West, 1991). The number of teams per module is entered as a control variable.
* $p \leq 0.05$.

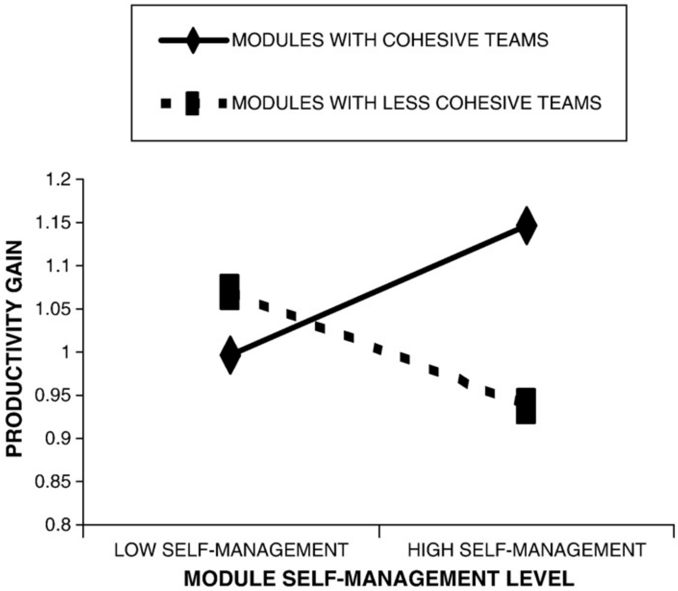

Fig. 4. Productivity gain as a function of interaction between module intra-team cohesion and module self-management.

This inquiry further extends past SMWT research on team self-management (Kirkman & Rosen, 1999; Wageman, 2001) and self-management leadership (Cohen et al., 1997; Manz & Sims, 1987) on collective performance by exploring emergent bottom-up effects of individual self-management on productivity of self-managing multi-team systems. Specifically, we established that self-managing competencies among team members do aggregate via composition processes to form higher-order collective constructs that predict MTS productivity. Moving beyond earlier work on aggregated individual self-management effects on team effectiveness (Langfred, 2000, 2004; Uhl-Bien & Graen, 1998), we demonstrated that this lower-level attribute can manifest even higher-order emergent effects on the performance of larger collectives (Kozlowski & Klein, 2000).

What is more, this study sustained growing reservations about excessively high individual self-management on collective effectiveness (Langfred, 2004; Pearce & Manz, 2005; Uhl-Bien & Graen, 1992, 1998). We demonstrated that team participants who self-manage too independently can jeopardize collective performance under conditions of team disunity and lack of cohesion. That is, MTS comprising divisive teams of strong self-managers were less productive than MTS comprising cohesive teams of high self-managers. While fostering more self-management among team participants, organizations must also ensure that members stay focused on the overarching collective mission and integrate their efforts into team processes (Pearce & Manz, 2005). Our results imply that employers place greater emphasis on team building that promotes emotional bonds to overcome potentially deleterious effects of extreme individual self-management (Chandler, Swamidass, & Cammann, 2003). They might use diversity training, collaborative problem-solving exercises, and conflict management training that integrate social activities. Of course, encouraging social cohesiveness in empowered teams should not come at the expense of greater groupthink (Moorhead et al., 1998) and social loafing (Langfred, 2004). In summary, organizations introducing self-managing multi-team systems should implement programs to enhance both group processes (e.g., cohesion) and individual self-management.

5.1. Methodological limitations

While heartening, the current findings were based on 21 MTS collectivities, though they represented the entirety of the plant's multi-team systems. Despite their modest number (not unusual in team-based studies; Barrick et al., 1998; Brown, 2003), modules nonetheless consisted of 97 teams and 716 individual members. Importantly, the present tests still identified significant collective ISM main effects as well as strong moderating effects of intra-team cohesion. More than this, our meta-team findings better mirrored workplace realities as businesses increasingly rely on multi-team projects to attain corporate-wide goals, such as development of the Boeing 777 aircraft (Sabbagh, 1996) and large-scale software design at Microsoft (Cusumano & Selby, 1995). Although challenging in terms of statistical power, meta-team investigations that recognize how teams are embedded in large collectivities may yield more externally valid conclusions.

Still our findings were drawn from one corporation in the semiconductor industry, limiting generalizability to other firms and industries. Statistical analyses also did not control other influences on team performance (e.g., demographic composition; Cohen et al., 1996; Kirkman & Rosen, 1999) that might account for observed self-management effects (Cohen et al., 1996). Additional statistical tests nonetheless revealed that demographic heterogeneity across teams and MTS did not affect performance. In a rare multivariate test, Cohen et al. (1996) however documented unique self-management effects on rated SMWT effectiveness even when statistically controlling other antecedents. Such extraneous influences were mitigated by sampling teams from the same plant that exposed them to the same management, human resource policies, training, and work design. Further, we assumed but did not empirically certify that collective ISM promotes MTS productivity via team performance given the absence of measures of team productivity.

5.2. Future directions

This field research merits further replication and extension. For example, we assumed that mean individual self-management within teams would foster greater team self-management, though the sole empirical inquiry into both individual and group autonomy in traditional teams suggests weak—if not inverse—relationships between these two forms (Langfred 2000). To validate our tenet, we call for simultaneous investigations of both team and individual self-management in empowered teams, especially as many theorists speculate about their possible conflict (Barker, 1993; Pearce & Manz, 2005; Uhl-Bien & Graen, 1998). Because our findings are drawn from a combined pooled-sequential arrangement MTS, further inquiry should strive to generalize them to intensive arrangement MTS environments, where component teams operate more interdependently (Marks et al., 2005). Moreover, the MTS collectives in this study are themselves sequentially interdependent because wafer processing must proceed across all modules and more complex wafers are processed across modules more than once. Further, our intra-team cohesion moderation warrants replication as we operationalized interpersonal attraction. Other aspects of group cohesion, such as task commitment and group pride, may also condition self-management effects (Beal et al., 2003).

Besides this, we suggest that consideration of other forms of emergence for individual ISM might impact collective performance via other compositional or compilation processes (Kozlowski & Klein, 2000; Ployhart, 2004). While we showed the value of an additive combination of individual ISM scores, collectivities might function well too if a few participants have "maximal" ISM scores and perform crucial team functions demanding more self-reliance, such as leadership or external liaisons (cf. Barrick et al., 1998). What is more, team diversity in ISM competencies may be beneficial if different team participants are competent at different self-leadership strategies (Barrick et al., 1998). Rather than all members being proficient in the full array of self-regulating tactics, teams might still carry their function if some members are adept at behavioral strategies, while other member can better deploy natural reward strategies.

Further determinations when self-management strategies boost team productivity promise to expand our insight into the conditions that combine to make self-managing teams flourish (Manz & Sims, 1993). To illustrate, Druskat and Wheeler (2003) suggest that external leaders can best support team self-management when they enact broad boundary-spanning activities, such as building political awareness and relationships with outside constituents. Though Brown (2003) showed that verbal self-guidance training can benefit self-managing student teams, development of team self-management competency deserves more scrutiny. How do SMWT best learn these techniques and can prospective members be screened for team membership based on preexisting self-management capabilities? We also reiterate DeChurch and Marks' (2006) call for more inquiry into MTS leadership as leading a collection of empowered teams requires different abilities than leading a single team (Manz & Sims, 2001).

Our research suggests several practical implications. In line with Chen et al.'s (2007) recent finding that managers can enhance team performance by using two distinct (but related) strategies to enhance individual and team empowerment, external leaders of SMWT teams must encourage self-management both personally and collectively. To enhance individual self-management, external leaders might engage in more one-on-one coaching or mentoring with team participants and ensure that excessive peer control does not constrain members (Barker, 1993). By comparison, external leaders might apply different interventions to foster team self-management. They might delegate more authority and responsibility to the team as a whole, help teams perform certain tasks together (e.g., problem-solving meetings), and acquire necessary material resources and information for teams (Wageman, 2001). Further, employers must ensure that teams embedded within a MTS collective are themselves empowered. Just as other team members can undermine individual members' autonomy (Barker, 1993), teams might restrict the freedom and latitude of other component teams.

Ultimately, empowered teams and team systems are combinations of individual team members. To the extent that members are self-leaders, they are in a better position to not only contribute to their own team's performance but also to the effectiveness of the multi-team system. While collective performance is determined by various factors, we found that a significant portion of this variance can be explained by self-management of individual members who are the most basic building blocks of networks of related teams. That said, continued investigations are needed if the empowered team movement is to live up to its potential rather than becoming a temporary management fad (Gibson & Tesone, 2001; Kulwiec, 2001).

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Appendix A

Factor matrix	SEXP	REM	SOBS	SJE	PROB	SMOT	REH	STALK	OT
1. I focus my thinking on the pleasant rather than the unpleasant feelings I have about my job activities.	0.36								
2. I actually make clear images in my mind of seeing myself successfully performing a task.	0.46								
3. At times, I try to describe, in writing, my thoughts of successfully overcoming challenges I face.	0.43								
4. I tend to think about the chances for good things in solving problems rather than dwell on the difficulties.	0.42								
5. I keep a record of my progress on tasks.		−0.41							
6. I use actual reminders (like notes, lists, etc.) to help me focus on things I need to accomplish.		−0.79							
7. I keep track of my progress on projects I am working on.		−0.42							
8. I use written notes to remind myself of what I need to do.		−0.76							
9. I set specific goals for my own performance.			0.48						
10. I pay attention to how well I am doing my work.			0.56						
11. I like to think through an important activity in my mind before I actually do it.			0.35						
12. I am usually aware of how well I am doing as I work on something.			0.48						
13. I choose to make improvements in how I do my work without being told to do so.				0.47					
14. I try to expand my area of responsibility.				0.50					
15. I look for activities that I can do that go beyond my normal responsibilities.				0.64					
16. I try to do more than I am asked, rather than less.				0.72					
17. I like to do things to solve problems by myself.					0.69				
18 I try to think of new ways of doing things.					0.54				
19. I think through solutions to problems on my own.					0.57				
20. I think up ways to solve my own problems before I ask others for help.					0.55				
21. I try to start new ways of doing things.					0.40				
22. I look for small successes in order to build my confidence.						0.38			
23. I look for, and try to do more of the things in my work that I enjoy doing.						0.56			
24. I try to really think about how right I am in my own beliefs about situations I am having problems with.						0.38			
25. I purposely look for successful people in order to convince myself that "I can do it too."						0.48			
26. I try to include tasks into my work that I like doing.						0.57			
27. I set specific goals in my mind for my day-to-day job duties.							−0.41		
28. I try to lock into my memory, tasks I need to accomplish.							−0.61		
29. I go over in my mind, my plans for completing tasks before I actually do them.							−0.61		
30. I sometimes try to describe out loud, my vision of successfully performing tasks.								0.50	
31. I give myself "pep-talks" in my mind to tell myself "I can do it."								0.35	
32. I sometimes find I talk to myself out loud when facing difficult problems.								0.68	
33. I purposely try to think about what I am saying to myself.								0.46	
34. I look for other ways to do things that provide opportunities rather than thinking of potential obstacles.									0.40
35. I try to take action to gain the benefits of opportunities I face rather than run away from problems.									0.53
36. I act on the benefits of opportunities, even if I face some significant obstacles.									0.54

Note. SEXP = self-expectation; REM = reminders; SOBS = self-observation; SJE = self-job-enrichment; PROB = problem-solving; SMOT = self-motivation; REH = rehearsal; STALK = self-talk; and OT = opportunity-thinking.

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