**Promoting Lean Team Effectiveness:**

**How Team Dynamics Affect Lean Performance Outcomes**

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## Abstract

Based on team-effectiveness theory, this study focuses on the dynamics of Lean teams and their members. Our aim was to discover which team dynamics have a positive effect on shop-floor Lean team performance. After extensive pre-testing and fine tuning in three rounds, a behavioral-dynamics survey was held among the 431 members of 31 Lean teams. Further, each' teams leader ($N$=34) and department head ($N$=39) rated team performance, customer satisfaction and a new measure of general Leanness. Our findings indicate that at an individual level, innovation and team cohesion are predictive of Lean team performance outcomes. Further, educational level and the number of months working with Lean were predictive of Lean team performance outcomes.

The research marks a preliminary step in determining the team dynamics for successful implementation and sustaining of Lean. However, larger-scale quantitative hypotheses-testing studies for exploring Lean team dynamics are recommended, combined with qualitative approaches such as video-registered behavioral observations, given their additional value over respondents' self-reports.

*Keywords*: *Lean team dynamics, Continuous improvement, group dynamics, team effectiveness, affective states, cognitive states, self-assessment, Lean behaviors.*

## Introduction

Lean thinking has made a significant impact to both the academic world and organizations (Hines, Holweg, & Rich, 2004). Lean has been defined as *"an integrated socio-technical system whose main objective is to* [continuously] *eliminate waste* [in operational processes] *by concurrently reducing or minimizing supplier, customer, and internal variability"* (Shah & Ward, 2007, p. 791). Much has already been written on the theory behind Lean (see, e.g. Womack & Jones, 1996), and the amount of best practice tools and methods has increased

dramatically over the years (see, e.g. Bhasin & Burcher, 2006; Bicheno & Holweg, 2009; Shook, 2010; Zu, Robbins, & Fredendall, 2010). However, many Lean efforts fail. Already, several researchers have proposed that success of Lean does not lie in simply implementing best practice tools and methods (Ballé, 2005; Bhasin & Burcher, 2006). Instead, these tools and methods are built upon a culture of Continuous Improvement (CI), which has to be instilled in the individuals within organizations. Knowledge of this cultural side of Lean would help organizations to successfully implement and sustain Lean, and thus enhance their performance (Aloini, Martini, & Pellegrini, 2011; Bessant, Caffyn, & Gallagher, 2001; Van Dun & Wilderom, 2012). Already, various researchers have tried to identify behavioral dynamics that constitute such a succesful Lean culture (most notably, Bessant, et al., 2001; Caffyn, 1999; De Lange-Ros & Boer, 2001; Jørgensen, Boer, & Gertsen, 2003; Ni & Sun, 2009). Most of these studies focused on the organizational level, and little attention has been paid yet to the Lean team dynamics in shop-floor team settings (Van Dun & Wilderom, 2012). However, shop-floor teams are considered the starting point for Lean implementation (Boer & Gertsen, 2003; Edmondson, Dillon, & Roloff, 2007), since much of the value of a product or service is created at the bottom of the organization pyramid (see e.g. Womack & Jones, 2003). Further, team-based working has increasingly become the norm in organizations (De Dreu & Weingart, 2003).

For the above reasons, we designed an online survey, which we used to discover which team dynamics contribute to Lean team performance in a shop-floor setting. With team dynamics, we refer to the patterns of interaction between Lean team members. The existence of a reliable measure of team dynamics in shop-floor Lean teams may stimulate more research in this increasingly important area of study. Thus, our guiding research question is:

*What are the team dynamics that are positively related to shop-floor Lean team performance?*

**Effective Lean Team Dynamics**

In this section, we first discuss the team level as a unit of analysis. Then, we reflect on existing Lean team self-assessments found in literature. Next, we address the input-mediator-output-input (IMOI) model for determining the effectiveness of teams. Based on this IMOI approach, we review the team dynamics that are relevant to the Lean team context.

**Defining Lean Teams**

In literature, several definitions of teams can be found. In this study, the focus is on teams who work according to the following five Lean principles: (1) Identification of customer value, (2) Classification of all the necessary steps of the value stream, to highlight non-value-adding waste, (3) Creation of an uninterrupted production flow, (4) Production that meets customer demands, and finally (5) Striving for perfection by continuously searching for and eliminating waste (Hines, et al., 2004; Van Dun & Wilderom, 2012). Further, the focus is on work teams. Kozlowski and Bell (2003, p. 334) defined work teams in such a way that it properly captures the type of teams we aim to investigate in this study:

*"collectives who exist to perform their organizationally relevant tasks, share one or more common goals, interact socially, exhibit task interdependencies, maintain and manage boundaries, and are embedded in an organizational context that sets boundaries, constrains the team, and influences exchanges with other units in the broader entity"*.

Specifically, the work teams we focus on in this study are at the operational level: the so-called shop-floor level (Boer & Gertsen, 2003). Employees at this level are closest to the actual product or service provision (Bicheno & Holweg, 2009). As explicated in the introduction, Lean is considered especially important at this shop-floor level, since much of

the value of a product or service is created in the bottom of the organization pyramid (see e.g. Womack & Jones, 2003). Imai (1997) explicitly called for involvement of shop-floor teams in Lean by referring to it as '*Gemba*', which can be translated as 'the real place', where improvement ideas must be formulated and implemented. Since, according to the fifth Lean principle, Lean teams are continuously looking for ways to improve their effectiveness, it is likely that such teams share team dynamics identified in the much more established field of team/group effectiveness. In the following section, we first address current Lean/ CI assessment tools. Then, we will discuss the IMOI model for determining the effectiveness of teams, followed by a review of the main team dynamics found in team effectiveness literature. Further, we included theory on TQM, CI, Kaizen and self-managed teams. Literature on TQM, CI and Kaizen is relevant because of their close relatedness to Lean; all have equal goals of continuous improvement and waste reduction (Andersson, Eriksson and Torstensson, 2006; Powel, 1995; Cua, Kone & Schroeder, 2001). Further, successful Lean teams are argued to be self-managing (Delbridge, Lowe & Oliver, 2000), as employee involvement is considered to be the key to Lean success (Imai, 1997). This is why we consider literature on self-managed teams to be relevant in a Lean team context as well.

**Lean Assessment Tools**

In order to effectively sustain Lean in an organization, it may be useful to regularly reflect on what is going well, what has stagnated, and what still needs to be improved (MacKerron, Masson, & McGlynn, 2003). A self-assessment tool would help in such a reflection. However, only a handful of researchers used this method for examining Lean/CI dynamics (Beale, 2007; Bessant, et al., 2001; Caffyn, 1999; Emiliani, 1998). Below, we discuss the existing Lean assessment tools.

Bessant and others (Bessant & Caffyn, 1997; Bessant, et al., 2001) developed a CI maturity model, which describes 32 behaviors that are crucial for long-term Lean success (for an overview of the behaviors, see Appendix I). The purported behaviors identified by Bessant et al. (2001) lack specificity, it is unclear as of yet how these behaviors manifest itself. For instance, "people are oriented towards internal and external customers in their CI activity" can become apparent in various ways. The same is true for the ten behaviors identified by Caffyn (1999), e.g. a "*shared set of cultural values underpinning CI*" can be manifested in many different ways. Also Beale (2007) studied the factors underlying the willingness of employees to adopt Lean behaviors. She distinguished seven factors that are even more generic than those identified by Bessant and others (Bessant & Caffyn, 1997; 2001; Caffyn, 1999) (see Appendix I). Earlier, Emiliani (1998) identified twenty-four value-adding Lean behaviors (see Appendix I). Again, these behaviors are very general. Moreover, some of the behaviors look more like personal characteristics, such as 'humility' and 'compassion'. For instance, 'self awareness' can be expressed by a multitude of individual behaviors. Further, the behaviors identified by Emiliani (1998) are not mutually exclusive. In sum, insofar the focus of current research into Lean team dynamics is on behaviors, and the specificity and mutual exclusivity with which this is done is questionable. This made it difficult to examine the actions demonstrated by these behaviors. Further, no attention has been paid to the cognitive and affective states of Lean team performance, and the relation amongst them and behavioral dynamics. However, emergent states are key elements influencing team effectiveness (Ilgen, et al., 2005, Marks, et al., 2011), and we expect them to be important in a Lean team setting as well. In our view, however, the most important caveat is the fact that the self-assessment tools are not exclusively targeted at the shop-floor level. Considering the fact that involvement and participation of shop-floor teams is the key to Lean team success, a shop-floor level self-assessment tool for investigating team dynamics is clearly warranted (Jørgensen, et al., 2003).

In the next chapter, we draw on literature from Lean, team effectiveness, TQM, CI, Kaizen and self-managing teams to identify the cognitive, affective and behavioral dynamics that are important for shop-floor Lean team performance.

**The IMOI Model of Team Effectiveness**

In this study, we look for those team dynamics that contribute to the performance of Lean teams. The foundation of the last 40 years of theory and research on team effectiveness is the input–process–output (I-P-O) framework of McGrath (Kozlowski & Ilgen, 2006), which was later substituted for the improved input-mediator-output-input (IMOI) model (Ilgen, Hollenbeck, Johnson, & Jundt, 2005). The IMOI model describes how mediators (team dynamics), which are influenced by input variables, account for a certain team performance. The IMOI model is used in this study, as it helps us to capture the dynamic nature of how Lean teams function. The team dynamics described in the IMOI model consist of emergent cognitive or affective states, as well as behavioral factors (DeChurch & Mesmer-Magnus, 2010; Ilgen, et al., 2005). In the next section, we discuss the Lean team dynamics that are of interest for this study, which are also depicted in Figure 1.
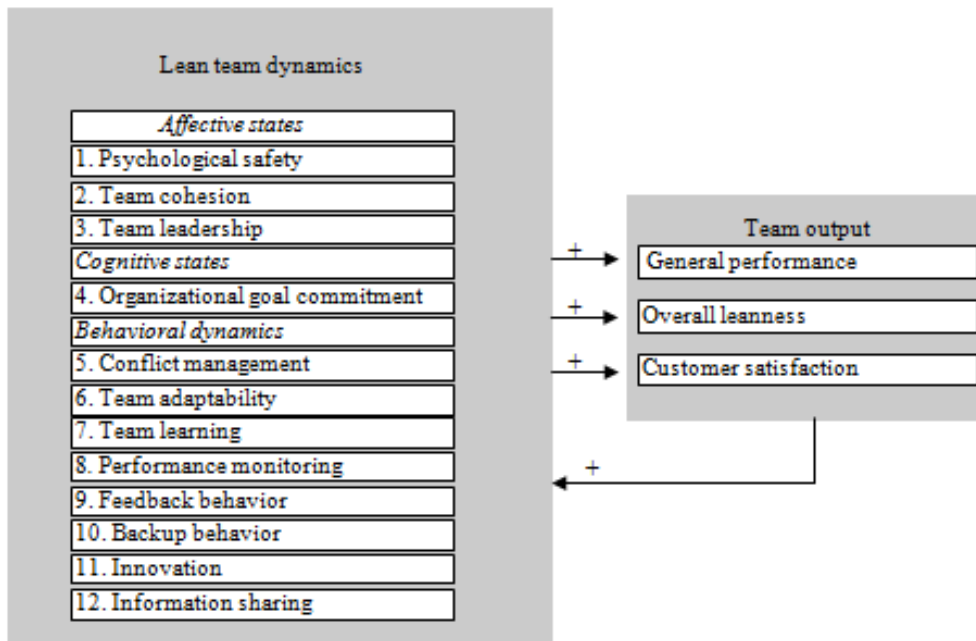
Figure 1

*The Mediating Lean Team Dynamics of Interest to our Study.*

**Lean Team Dynamics**

In the following section, the Lean team dynamics that are of interest to our study are discussed. Since the amount of studies on behavioral dynamics in effective teams is overwhelming, we focused on three much-cited team effectiveness literature reviews: Kozlowski and Ilgen (2006); Marks, Mathieu and Zaccaro (2001); and Salas, Sims and Burke (2005). From these studies, five behavioral dynamics were derived: Adaptability, backup behavior, conflict management, performance monitoring, information sharing, and team learning. We also included innovation as a behavioral dynamic, as identified by Van Dun and Wilderom (2012). Further, feedback was initially considered to be part of backup behavior, as well as performance monitoring. However, more recent work has tended to treat performance monitoring, feedback and backup behavior as separate constructs, which is why we treat all three items as such.

The affective and cognitive states are based on a recent literature review on Lean team dynamics by Van Dun and Wilderom (2012), and include the following: Psychological safety, team cohesion, and organizational goal commitment. Further, team leadership was included as an affective state (Kozlowski and Ilgen, 2006); Marks, Mathieu and Zaccaro, 2001; Salas, Sims and Burke, 2005).

An overview of the included team dynamics can be found in Figure 1. Below, we first address the affective states, followed by the cognitive states. Lastly, the behavioral dynamics are discussed.

**Affective States**

*1. Psychological safety:* Psychological safety in a team involves the shared belief that the team is a safe context for interpersonal risk-taking (Edmondson, 1999). In psychologically safe climates, team members are able to apply behaviors such as feedback, information sharing, experimenting, asking for help, and discussing errors (Edmondson, 1999). This is because they believe that if they make a mistake, others will not penalize them or think less of them for it, which gives team members the confidence to take the risks associated with the behaviors described above (Edmondson, 1999). In Lean team research, psychological safety has not been addressed yet. However, Rothenberg (2003), Emiliani (1998) and Jackson and Mullarkey (2000) did study trust levels in Lean teams, which they found to be higher than in similar non-Lean teams. Further, trust has been linked to successful TQM implementation (Emery, Summers, & Surak, 1996). Rothenburg (2003) argued that without trust, employees will not contribute to the continuous improvement of company work practices, whilst this is a key aspect of Lean. Since a psychologically safe environment entails trust, we expect psychological safety to be important for Lean team performance.

*H1: Psychological safety is positively related to Lean team performance.*

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*2. Team cohesion*: Team cohesion is defined as "*the tendency for a group to stick together and remain united in the pursuit of its instrumental objectives*" (Tekleab, Quigley, & Tesluk, 2009). Team cohesion is mostly affective, since it focuses on the extent to which individuals feel positive about their team members. A large amount of meta-analyses have been conducted regarding the relationship between cohesion and performance (Beal, Cohen, Burke, & McLendon, 2003; Carron, Colman, Wheeler, & Stevens, 2002). From these meta-analyses, the general conclusion appears to be that cohesion is significantly moderately and positively correlated to team performance. The moderate link between team cohesion and performance may be found for three reasons. First, one important caveat to current team cohesion-performance research is the fact that no attention has been paid to specific types of teams, which makes it difficult to apply results to a specific team type (Chioccio & Essiembre, 2009). Second, it has been suggested that a high level of team cohesion might lead to groupthink, which may compromise the quality of team decision making and problem solving (Tekleab, et al., 2009). Van Dun and Wilderom (2012) suggested that in a Lean team setting, groupthink causes team members to conform to a certain mindset with fixed and narrow assumptions, which might hold back any further performance improvement or learning. Therefore, groupthink is likely to be especially harmful in a Lean team setting. As such, team cohesion might be a hygiene factor, instead of a motivational factor (see Herzberg, 1968); it provides an essential foundation for team performance, but is not contributing to it in itself. We therefore expect that in Lean teams, the relation between team cohesion and performance is nonlinear: Team cohesion contributes to team performance, but only to a certain degree; if team cohesion is too high, the effect on performance is negative:

*H2: An inverted U-relation exists between team cohesion and Lean team performance.*

*3. Team Leadership*. The team leader is of vital importance in enabling effective teamwork (Day, Gronn, & Salas, 2004). Team leaders can have a positive influence on affective, behavioral and cognitive dynamics (Zaccaro, Rittman, & Marks, 2001), for instance; they can create and support a teams' social climate (Ganster, Fusilier, & Mayes, 1986; Morgeson, DeRue, & Karam, 2010), which entails psychological safety and team cohesion; and they can promote team learning and adaptation among team members (Edmondson, 1999). A team leader's positive influence on these dynamics requires dyadic relationships of high-quality between team leaders and their team members (Graen & Uhl-Bien, 1995). Such type of relationship between team leader and team member is known as high Leader-member exchange (LMX). It was found that performance increased when team leaders develop high-quality relationships with all their team members (Graen & Uhl-Bien, 1995). We expect that team leadership is important for shop-floor Lean teams as well. This may sound as a paradox, since effective Lean teams are considered to be self-managing (Delbridge, Lowe & Oliver, 2000). However, in self-managing team literature, it is argued that a team leader can help a team to manage itself (Manz & Sims, 1987). Similarly, Ooi, Arumugam, Teh, & Chong (2008) concluded that it is a Lean leader's task to empower his or her direct reports to express their ideas. Therefore, we propose the following:

> H3: Team leadership is positively related to Lean team performance.

**Cognitive States**

*4. Organizational Goal Commitment*: Organizational goal commitment is defined here as the extent to which team members are attached to or determined to reach the organizational goal, regardless of the goal's origin (based on Locke, Latham, & Erez, 1988). Recently, some scholars have addressed the effects of organizational goal commitment on Lean team

outcomes (Aloini, et al., 2011; Bessant, et al., 2001; Caffyn, 1999; Delbridge, 1995; Zeitz, Johannesson, & Ritchie, 1997). Bessant et al. (2001) and Caffyn (1999) suggested that members of advanced Lean teams show a high level of awareness of both company goals and strategic performance measures. Aloini et al (2011) argued that Lean team members assess their proposed improvements against strategic objectives to ensure consistency. Further, Lean team members "*use the the organisation's strategy and objectives to focus and prioritise their improvement activities*" (Aloini, et al., 2011, p. 646). Van Dun and Wilderom (2012) hypothesized that before Lean is able to take root in a team, its members need to subscribe on a cognitive level to the company's strategic continuous improvement goals.

A team-effectiveness literature review by Meyer, Stanley, Herscovitch, and Topolnytsky (2002) showed that affective commitment to an organization has a strong relationship with organization-relevant outcomes (such as performance and attendance), as well as with employee-relevant outcomes (such as stress). One form of such affective commitment is organizational goal commitment. Given the fact that organizational goal commitment is a form of affective commitment, we expect that the abovementioned positive outcomes also apply to organizational goal commitment. Further, since organizational goal commitment has already been suggested to be positively related to Lean team performance, we propose the following:

H4: *Organizational goal commitment is positively related to Lean team performance.*

**Behavioral Dynamics**

Below, we discuss the five behavioral dynamics as derived from Kozlowski and Ilgen (2006); Marks, Mathieu and Zaccaro (2001); Salas, Sims and Burke (2005) and Van Dun and Wilderom (2012): conflict management, adaptability, team learning, performance monitoring and backup behavior; complemented with, feedback and innovation.

*5. Conflict Management:* Conflict can be defined as "*perceived incompatibilities or discrepant views among team members*" (Jehn & Bendersky, 2003, p. 189). The effective management of such conflicts is associated with several positive relational outcomes, such as higher team cohesion (Tekleab, et al., 2009) and mutual trust (Van de Vliert, Euwema, & Huismans, 1995). Further, Jehn (1997) found that in groups were conflicts are discussed in the open, members willingly discuss problems. Openly discussing problems in such a manner is useful for problem solving (De Dreu & van de Vliert, 1997; Jehn, 1995) and thus may help in finding possibilities for improvement, which is an important aspect of Lean. Further, conflict management may be an important antidote for groupthink (Chen, Liu, & Tjosvold, 2005), which we already identified as being harmful for Lean team performance (Van Dun and Wilderom, 2012). Therefore, we expect the following:

*H5: Conflict management is positively related to Lean team performance.*

*6. Adaptability*: Adaptability refers to "*team members' ability to adjust their behavior based on information gathered from the environment through backup behavior, reallocation of intrateam resources and altering a course of action or team repertoire, in response to changing team condition*s" (Salas, et al., 2005, p. 560). By properly responding to changing team conditions, it is more likely that a team's objectives will be met, thus increasing team performance (Salas, et al., 2005). High team adaptability is typically found in highly-effective

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teams (Kozlowski & Ilgen, 2006; Salas, et al., 2005). Further, Beale (2007) identified labor flexibility as a factor underlying employee willingness to adopt the Lean work approach.

Continuously adapting to a changing environment is the foundation of continuous improvement, which is the fifth Lean principle (Hines, et al., 2004). Therefore, we expect that adaptability contributes to the performance of effective Lean teams.

*H6: Team adaptability is positively related to Lean team performance.*

*7. Team learning*: For a team to be able to improve, it needs to acquire knowledge and information. The acquisition of knowledge and information has to do with *team learning*. Team learning represents a dynamic, ongoing process "*of reflection and action, characterized by asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected outcomes of actions*" (Edmondson, 1999, p. 353). Team learning is typically found in effective teams (Kozlowski & Ilgen, 2006, Edmondson, 1999; Edmondson et al., 2007; Van den Bossche, Gijselaers, Segers, & Kirschner, 2006). It is likely that this behavior is important in Lean teams as well, since CI is based on continuous learning processes that take place sequentially (Bartezzaghi, Mariano, & Verganti, 2004; Bessant, Caffyn, Gilbert, Harding, & Webb, 1994; Edmondson, 1999). Indeed, Caffyn (1999) and Aloini et al (2011) propose that in a CI setting, individuals learn from experiences and ensure this learning is incorporated into the organization.

*H7: Team learning is positively related to Lean team performance.*

*8. Performance Monitoring*: Performance monitoring –also labelled as 'mutual performance monitoring'- entails actively keeping an eye on the activities and performance of other team members (Marks, Mathieu, & Zaccaro, 2001). Initially, performance monitoring was referred to as 'team monitoring', together with 'feedback' and 'backup behavior' (e.g., Marks, et al., 2001). However, more recent work has tended to treat performance monitoring, feedback and backup behavior as separate constructs (see, e.g., Marks & Panzer, 2004). Van Dun et al. (2011) suggested that effective Lean teams may be composed of members who maintain a high awareness of team functioning. Such awareness enables individuals to recognize inadequate performance or mistakes from team members (Bessant et al., 2001). Further, performance monitoring is likely to enable Lean team members to anticipate on events, or to find new areas for improvement. Therewith, we expect that performance monitoring contributes to Lean team performance.

*H8: Performance monitoring is positively related to Lean team performance.*

*9. Feedback Behavior*: By openly discussing work-related information, team members can address errors and lapses, and solving those may ultimately lead to higher team performance. Indeed, Aloini et al (2011) found that in a CI setting, people provide each other with positive feedback; they do not blame each other when something goes wrong, instead, they look for reasons why. Such feedback can lead to learning behavior and goal accomplishment (Kozlowski & Ilgen, 2006). As already discussed, we expect team learning to be essential for Lean team performance. Therefore, we propose the following:

*H9: Feedback behavior is positively related to Lean team performance.*

*10. Backup behavior*: Backup behavior is defined as "*the discretionary provision of resources and task-related effort to another member of one's team that is intended to help that team member obtain the goals as defined by his or her role*" (Porter et al., 2003, p. 391). The general consensus is that backup behavior, and similar concepts such as workload sharing and helping behavior (Podsakoff & MacKenzie, 1997), are positively correlated to team performance (Porter, et al., 2003). However, it has also been suggested that a large amount of backup behavior can be counterproductive as it masks underlying problems by only fixing symptoms (Bicheno & Holweg, 2009). Indeed, Barnes et al. (2008) found a high amount of back-up behavior to be negatively related to team performance. We therefore expect that in Lean teams, the relation between backup behavior and team performance is nonlinear: Backup behavior contributes to team performance, but only to a certain degree; if backup behavior is too high, the effect on performance is negative:

> H10: An inverted U-relation exists between backup behavior and Lean team performance.

*11. Innovation*. Whilst the term innovation is commonly used, it can take on a variety of meanings (for a thorough review of the various definitions of innovation, see Baregheh, Rowley, & Sambrook, 2009). Here, we view innovation as an orientation towards radically improving current work practices. This is based on the idea that innovation is about creating certain innovation routines, grounded in recurring and reinforced patterns of behavior (Bessant, 2003). Similar to this view, Van Dun and Wilderom (2012) argued that CI efforts of high-performing Lean teams lead to a high level of change orientation in terms of both CI and innovation. Further, Bessant et al (2001) proposed that once CI capability is established, this capability can contribute to innovation routines. Zeitz et al (1997) identified innovation as a

TQM culture practice, and found innovation outcomes improved significantly over the course of a TQM program.

We expect that teams which are oriented towards innovation increase their probability of finding innovative solutions to their operational problems, which likely contributes to higher Lean team performance. Therefore, we expect the following:

*H11: Innovation is positively related to Lean team performance.*

*12. Information Sharing*: A final behavioral dynamic that is considered to be a key characteristic of effective teams is *information sharing* (see, e.g., Bunderson & Boumgarden, 2010). Information sharing constitutes the process where individuals mutually exchange their (tacit and explicit) information in the support of their coordinating behaviors (adapted from De Vries, Van Den Hooff, & De Ridder, 2006; Kozlowski & Ilgen, 2006). Information sharing is an important precondition for team learning to occur, since the sharing of information exposes team members to a larger and richer pool of ideas and data (Argote, Gruenfeld, & Naquin, 1999). Already, Aloini et al (2011) found that in a CI setting, individuals and teams at all organizational levels share their learning experiences.

Closely related to this exposure is the expectation that information sharing leads to higher innovativeness (De Vries, et al., 2006), and avoidance of errors (Johnson, Hollenbeck, Humphreys, & Ilgen, 2006), all of which likely contribute to team performance. Van Dun and Wilderom (2012) suggested that information sharing contributes to Lean team performance as well: they argued that "*intra-team sharing of work-related information […] may have a performance enhancing effect*" (Van Dun & Wilderom, 2012, p. 128). Further, they argued information sharing enables team members to work to full capacity (Van Dun & Wilderom, 2012). Therefore, we propose the following:

*H12: Information sharing is positively related to Lean team performance.*

In the next section, we elaborate how we tested the hypotheses on the affective, behavioral and cognitive dynamics with a newly designed survey instrument, mostly consisting of previously developed scales from team effectiveness literature.

## Methodology

In order to obtain a well-founded explication of affective, behavioral and cognitive dynamics of highly effective Lean teams, we developed an online survey. For this purpose, we performed three pretests (see Figure 2), for which we will now provide a short overview. The goal of the pretest rounds was to ensure that the used constructs and items were sufficiently valid and reliable to use in the main study. In every pretest round, we performed reliability analyses, and subsequently deleted or replaced redundant items or added items if necessary. After having developed an online survey, we used the survey in the main study to examine the Lean teams dynamics and their effects on Lean team performance. In the following section, we separately describe the sample, procedure and our data-analysis strategy for each of the four subsequent steps in the research process.
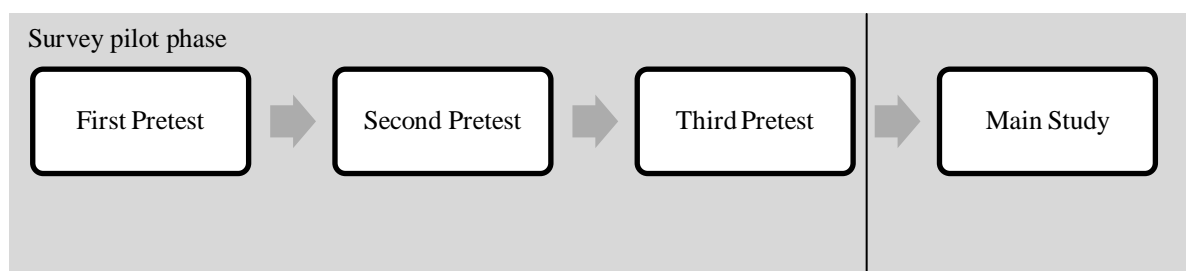


Figure 2

*Research Rounds*

**First Pretest**

Below, the properties of the first pretest are discussed. First, we address the sample, followed by the procedure of data collection. Lastly, the measures from the first pretest are explicated.

    **Sample**

We started with a widely distributed call for the (self-) nomination of effective Lean teams. We used an article on a major Dutch managerial website for this purpose and announced it in a management-executive journal as well as in various active Dutch (online and offline) networks for Lean managers. This resulted in about 30 teams, from which we selected five teams that met the following criteria: 1) The team implemented a continuous improvement strategy more than one year prior to this study; 2) The team continuously enhances their own work habits; 3) The team established stable growth in the following quantitative performance measures: employee satisfaction; customer satisfaction; and financial results. This pretest was an exploratory step, as we wanted to identify the behavioral dynamics in five high-performing Lean teams.

From the five high-performing shop-floor Lean teams ($N = 60$), 52% was male (48% female) and 58% worked fulltime (42% part-time). On average, they worked for 4.1 years in the team ($\sigma = 3.94$) and 17.9 years in the organization ($\sigma = 10.02$). An extensive description of the teams is displayed in Table 1.

Table 1

*Description of the Five Selected High-Performing Lean Teams*

| Type of organization | Main team task | Lean Maturity (in months) | Team size (incl. team leader) | Gender | | Employment | |
|---|---|---|---|---|---|---|---|
| | | | | M | F | Full-time | part-time |
| Truck Manufacturing | Assembling trucks | 147 | 11 | 89% | 11% | 67% | 33% |
| Retail Manufacturing | Assembling small consumer products | 87 | 6 | 89% | 0% | 100% | 0% |
| Mail Distributor | Sorting irregular mail by hand | 26 | 13 | 11% | 89% | 10% | 90% |
| Health Insurance | Handling claims of private persons | 19 | 36 | 36% | 64% | 68% | 32% |
| Tax Administration | Monitoring taxes | 12 | 10 | 56% | 44% | 44% | 56% |

**Procedure of data collection**

The teams' department head was asked if he and his team would like to participate. Next, we distributed a survey among the team members. The first page of the survey consisted of an introduction of the research, a statement ensuring anonymity of the results, and the duration for filling in the survey (20 minutes). After reading the first page, respondents could fill out the questionnaire. After filling in the survey, respondents handed us the survey.

**Measures**

The constructs that emerged from our theoretical framework were measured with previously validated scales, which we translated to Dutch. In order to be able to later aggregate individual responses to the team level, we changed the referent in the individual-level measures, following the referent-shift consensus composition method (see Chan, 1998). For example, we rephrased the original 'information sharing' item *'When I need certain knowledge, I ask my colleagues about it'* (Van den Bossche et al, 2006, p. 131) into *'When team members need certain knowledge, they ask other team members for it'*. Below, we will discuss each survey measure.

*Conflict management* was measured using a four-item scale of Tekleab et al (2009, p. 198). A typical example of this scale is "*Our team knows what to do when a conflict occurs between team members*".

*Backup behavior* was assessed using a six-item scale by Seers (1989, p. 125) (e.g. "*Helps orient new people even though it is not required*").

*Team learning* was measured using a scale of Edmondson (1999, p. 383), consisting of 5 items (e.g. "*We regularly take our time to think of ways to improve the work process*").

We measured *team leadership* with the leader-member exchange scale by Graen and Uhl-Bien (1995, p. 237), consisting of seven items (e.g. "*Our team leader understands our job problems and needs*").

*Adaptability* was assessed with a four-item scale of Angle and Perry (1981, p. 14) (e.g. "*People in this team do a good job in keeping up with changes in new equipment and new ways of doing things*").

*Information sharing* was measured using a scale from De Vries et al (2006, p. 131), consisting of eight items (e.g. "*When team members need certain knowledge they ask other team members for it*").

*Team cohesion* was measured using a five-item scale of Chin, Salisbury, Pearson, & Stollak (1999, p. 752) (e.g. "*I see myself as part of this group*").

*Team performance* was measured with a four-item scale of Van den Bossche et al (2006, p. 507) (e.g. "*We are satisfied with the performance of our team*").

Further, we assessed *general Leanness*, which is a self-designed output variable, consisting of three items (Van Dun, Van Eck, Van Vuuren, & Wilderom, 2011) ("*How do you judge the level of continuous improvement within your team?*").

Lastly, we developed a five-item scale to measure *feedback behavior*, based on the construct known as '*effectively giving suggestions or criticism*' (Morgan, Glickman,

Woodard, Blaiwes, & Salas, 1986, p. 72) (e.g. "*called attention to a mistake made by another member without being negative*"). All constructs, except for 'General Leanness', were measured on a 7-point Likert scale, ranging from 'strongly disagree' (1) to 'strongly agree' (7). General Leanness was assessed using a five-point Likert scale, ranging from 'strongly disagree' (1) to 'strongly agree' (5). All items were randomized for each respondent, in order to prevent response set bias.

Descriptive statistics (M and SD) and coefficient alphas for each variable are shown in Table 2. All scales were sufficiently reliable ($\alpha > 0.7$). We further included questions about the respondent, including gender; age; team tenure; organization tenure; educational level; and job position.

Table 2

*Results from the First Pretest Round*

| Scale | M | SD | Cronbach's alpha |
|---|---|---|---|
| 1. Conflict Management | 4.24 | 1.12 | .79 |
| 2. Feedback Behavior | 4,75 | 0.91 | .76 |
| 3. Backup Behavior | 5,35 | 1.12 | .66 |
| 4. Team Adaptability | 5.03 | 0.96 | .77 |
| 5. Team Learning | 4.67 | 0.98 | .76 |
| 6. Information Sharing | 5.07 | 0.91 | .86 |
| 7. Team Leadership | 6.04 | 0.49 | .72 |
| 8. Team Cohesion | 5.07 | 1.00 | .88 |
| 10. Team Performance (Team Leader) | 5.75 | 0.73 | .78 |
| 11. General Leanness (Team Leader) [a] | 3.71 | 0.57 | .75 |

*Note.* Diagonal entries represent scale reliabilities. $N = 5$ Lean work teams, consisting of 55 team members and 5 team leaders.

[a] General Leanness was measured on a 5-point scale.

**Second Pretest**

Since we were not fully content with results from the first pretest, we conducted a second pretest. For this pretest, we made some adaptations to the backup behavior construct, given its low alpha in the first pretest round. Further, we added psychological safety as a construct,

since we had newly identified this construct in the literature. Below, we will discuss the new sample and the adjustments made to the first survey version.

### Sample

The second pretest was conducted amongst a work team in a major Dutch health-insurance company. The team was approached via Lean consultants of a management consulting firm specialized in Lean. The team consisted of 87 shop-floor employees, who worked with Lean for two months. All team members (response rate = 100%, N = 87) participated in the pretest. 20% of the respondents was male (80% female), and 46% worked full-time (54% part-time). On average, they worked in the team for 11.3 years ($\sigma = 7.47$), and in the organization for 21.4 years ($\sigma = 9.60$).

### Procedure of data collection

The teams' department head was asked if he and his team would like to participate. Next, team members were sent a link to an online survey by two Lean consultants. The first page of the survey consisted of an introduction of the research, a statement ensuring anonymity of the results, and the duration for filling in the survey (30 minutes). After reading the first page, respondents could fill in the survey. The pretest was conducted as part of a Lean implementation project by two Lean consultants. The two Lean consultants presented the results from the pretest to the participating team with a personal comparative feedback profile in terms of team dynamics.

### Measures

In the second pretest, we adapted the first pretest survey based on the reliability analyses results from the first pretest. First, in order to better measure 'backup behavior', we added

five items from the 'organizational citizenship behavior' scale (Smith, Organ, & Near, 1983), which measures 'altruism'. Next, we rephrased the following item from the 'backup behavior' scale (translated to Dutch) "*Ons team is flexibel in het veranderen van werktaken, om het voor anderen makkelijker te maken*" into "*Teamleden zijn flexibel in het veranderen van werktaken, om het voor andere teamleden makkelijker te maken*" to improve face validity. Since we had no scores from team leaders, we could not check alpha's for team performance and general Leanness.

Further, we added a scale to measure 'psychological safety' (e.g. "*If you make a mistake on this team, it is often held against you.*") (Edmondson, 1999, p. 382), as we had newly identified this construct in the literature and wanted to include the construct in the analysis.

Descriptive statistics (M and SD) and coefficient alphas for each variable are shown in Table 3. Apart from psychological safety, all scales were reliable ($\alpha > 0.7$). Psychological safety had an alpha of .68, which we considered acceptable given the small sample.

Table 3

*Results from the Second Pretest Round*

| Scale | M | SD | Cronbach's alpha |
|---|---|---|---|
| 1. Conflict Management | 4.95 | 1.02 | 0.84 |
| 2. Feedback Behavior | 4.82 | 1.03 | 0.85 |
| 3. Backup Behavior | 5.83 | 0.62 | 0.85 |
| 4. Team Adaptability | 5.42 | 0.86 | 0.81 |
| 5. Team Learning | 4.94 | 0.83 | 0.71 |
| 6. Information Sharing | 5.57 | 0.61 | 0.82 |
| 7. Team Leadership | 5.34 | 1.03 | 0.95 |
| 8. Team Cohesion | 5.89 | 0.66 | 0.82 |
| 9. Psychological Safety | 3.32 | 0.51 | 0.68 |

*Note.* Diagonal entries represent scale reliabilities. $N = 5$ Lean work teams, consisting of 85 team members

## Third Pretest

On the basis of the second pretest, we again made some adjustments to the survey. First of all, we added a scale to measure performance monitoring. Further, we developed a new survey for the team's department in order to avoid common method bias resulting from team members assessing their own performance. Finally, we retranslated the measures from English to Dutch following the translation/back-translation method (Brislin, 1970), since we wanted to ensure fundamental conceptions were retained in the first translation. Below, the adjustments to the second survey are discussed, as well as the new sample.

### Sample

Team members (N = 67), department heads (N=5) and leaders (N = 11) from seven teams participated in our pretest. Two teams were from a hospital, and five from a financial institution. The teams were recruited by announcing the study in various Dutch networks for Lean specialists, as well as via Lean consultants of a management consulting firm specialized in Lean, and a presentation at a Lean implementation seminar. All participating teams were shop-floor teams, who worked according to Lean, which were our preconditions for participation. The teams had differing Lean experience (1 to 24 months). Further, 42% was male (58% female) and 53% worked fulltime (47% part-time). On average, they worked in the team for 5.40 years ($\sigma = 7.12$) and in the organization for 13.40 years ($\sigma = 9.57$). For a full description on the participating teams, see Table 4.

Table 4

*Descriptions of the Seven Participating Lean Teams*

| Type of Organi-zation | Main Team Task | Lean Maturity (in months) | No. of individual responses | Response rate | Gender | | Employment | |
|---|---|---|---|---|---|---|---|---|
| | | | | | M | F | Full-time | Part-time |
| Hospital | Career advisory centre | 24 | 8 | 63% | 25% | 75% | 43% | 57% |
| Hospital | Cleaning operating room instruments | 24 | 35 | 65% | 40% | 60% | 58% | 42% |
| Financial institution | Advising clients on sales and service | 1 | 8 | 100% | 25% | 75% | 63% | 37% |
| Financial institution | Supporting companies with their purchased products | 1 | 7 | 100% | 0% | 100% | 33% | 66% |
| Financial institution | Advising corporate clients on sales | 1 | 5 | 86% | 60% | 40% | 100% | 0% |
| Financial institution | Advising companies in financing decisions | 1 | 7 | 100% | 28% | 72% | 100% | 0% |
| Financial institution | Handling insurance claims of corporate clients | 3 | 8 | 100% | 71% | 29% | 71% | 29% |
| Average | - | 5 | 11 | 88% | 31% | 54% | 51% | 30% |

**Procedure of data collection**

A link to the online survey was sent to the team leader or department head, who distributed the survey amongst the team members. In order to ensure response rates were high, the team leaders or department heads were asked to encourage team members to fill out the survey.

The first page of the survey consisted of an introduction of the research, a statement ensuring anonymity of the results, and the duration for filling in the survey (30 minutes). After reading the first page, respondents can fill in the survey.

In exchange for their participation, team leaders and department heads of each participating team were presented with personal comparative feedback profiles in terms of team dynamics. We deliberately prepared those sessions together with a Lean consultant. A key question in these face-to-face feedback sessions was whether they recognized their teams in our findings.

**Measures**

The survey measures were largely comparable to pretest rounds one and two. However, on the basis of the second pretest, we made some further adjustments. First of all, we added a scale from De Jong & Elfring (2010, p. 549; based on Langfred, 2000) in order to measure performance monitoring (e.g. "*In this team we check whether everyone is doing what is expected of him/her*."). As argued in our literature review, performance monitoring is recently regarded as being distinct from backup and feedback behavior (e.g.,Marks & Panzer, 2004), which is why we measure these three variables with separate scales. Further, we replaced the team cohesion scale of Chin et al. (1999) by a scale of task cohesion (e.g. "*This team is united in trying to reach its goals for performance*." (Van den Bossche, et al., 2006, p. 505) and social cohesion (e.g. "*We like our team*") (Van den Bossche, et al., 2006, p. 505). Finally, we rephrased three negatively formulated items of which respondents in previous rounds had pointed out they had trouble with understanding and answering them.

Moreover, we developed a new survey for the team's department heads (see Appendix IV). Department heads' were asked about the teams' performance, customer satisfaction and general Leanness. This way, we were able to avoid common method bias resulting from team members assessing their own performance. Customer satisfaction was measured with a measure consisting of two items of Edmondson's scale (Edmondson, 1999, p. 382) (e.g. "*Those who receive or use the work this team does often have complaints about our work*") and two items from Wong and Tjosvold (2002, p. 104) (e.g. "*The customer is satisfied with our response time*"). Team performance was measured using a three-item scale adapted from Aubé and Rousseau (2005, p 204) (e.g. "*This team is productive*"). For general Leanness, we used the same three-item scale as in the team member survey.

We retranslated the measures from English to Dutch following the translation/back-translation method (Brislin, 1970), since we wanted to further ensure fundamental

conceptions were retained in the first translation. We therefore had an expert who was not involved in the study retranslate all scales from English to Dutch. Differences in both translations were examined and discussed. Then, the items were back-translated into the original language by a professional translator who was not involved in the study. Finally, we checked whether the back-translation matched the contents of the original items, which was the case.

Descriptive statistics (M and SD) and coefficient alphas for all variables are shown in Table 5. All scales were highly reliable ($\alpha > 0.7$), with the exception of the newly added scales 'social cohesion' ($\alpha = .61$) and 'task cohesion' ($\alpha = .57$). Hence, apart from task cohesion and social cohesion, we were confident enough to use the scales in our main study.

Table 5

*Results of the Third Pretest Round*

| Scale | M | SD | Cronbach's alpha |
|---|---|---|---|
| 1. Conflict Management | 4.30 | 1.44 | .89 |
| 2. Performance Monitoring | 4,19 | 1.24 | .86 |
| 3. Feedback Behavior | 4.50 | 0.99 | .71 |
| 4. Backup Behavior | 5.27 | 0.99 | .89 |
| 5. Team Adaptability | 4.70 | 1.05 | .82 |
| 6. Team Learning | 4.70 | 1.27 | .86 |
| 7. Information Sharing | 4.97 | 1.07 | .92 |
| 8. Innovation | 4.57 | 1.08 | .78 |
| 9. Team Leadership | 5.49 | 1.02 | .90 |
| *10. Team Cohesion* | | | |
| 10a. Task Cohesion | 4.79 | 1.03 | .57 |
| 10b. Social Cohesion | 5.40 | 0.76 | .61 |
| 11. Psychological Safety | 4.07 | 0.62 | .76 |
| 12. Organizational Goal Commitment | 5.70 | 0.86 | .87 |
| 13. Team Performance (Team Leader) | 5.39 | 1.06 | .82 |
| 14. General Leanness (Team Leader) [a] | 3.70 | 0.89 | .85 |
| 15. Team Performance (Department Head) | 4.42 | 2.23 | .92 |
| 16. Customer Satisfaction (Department Head) | 4.05 | 1.57 | .81 |
| 17. General Leanness (Department Head) [a] | 3.00 | 1,25 | .95 |

*Note.*    $N = 7$ Lean work teams, consisting of 67 team members and 11 team leaders.
[a] General Leanness was measured on a 5-point scale.

**Main Study**

Below, we will consecutively address the sample, procedure, instrumentation and data analysis of our main study.

### Sample

The main study was conducted amongst members of 31 shop-floor teams with differing Lean experience (ranging from 1 to 120 months, 28.41 months on average). These teams had not yet participated in our pretests. From the team members (N = 504, including team leaders), 59% was male (41% female) and 70% worked fulltime (30% part-time). On average, they worked for 5.70 years in the team ($\sigma = 6.25$) and 13.50 years in the organization ($\sigma = 11.06$). The 31 teams covered a diverse set of 15 organizations, active in the public sector, production firms and commercial firms. The average response rate was 84%. Non-response bias was partially controlled for by asking team leaders and their department heads afterwards, in a face-to-face feedback session, whether they suspected non-response had resulted from differences in certain opinions or other characteristics between team members. This was not the case. A full overview of the participating teams can be found in Appendix II.

### Procedure of data collection

The procedure for the main survey was mostly equal to the procedure followed in pretest 3. However, there was one difference: In some teams, the survey was distributed on paper, depending on team members' access to computers at their workplace.

**Instrumentation**

After extensive testing and fine-tuning of the online survey in three pretest rounds, we were confident that the survey was an appropriate instrument to measure Lean team dynamics. On the basis of the third pretest, however, we made a final adjustment to the survey: The 'task cohesion' and 'social cohesion' measures that were added in the third pretest were replaced by the 'team cohesion' measure used in the first and second pretest, since both the 'task cohesion' ($\alpha = .57$) and 'social cohesion' ($\alpha = .61$) scales proved unreliable. The final survey instrument can be found in Appendix III.

All scales were once more assessed for their internal reliability. Psychological safety ($\alpha = .69$) and team leaders' score on team performance ($\alpha = .67$) demonstrated alphas below the .70 cutoff point, which is why we eliminated the constructs. All other scales were reliable, with alphas above .70, see Table 6. Further, general Leanness consisted of two items, and demonstrated a Pearson correlation of .77 for department heads' score, and .54 for team leaders' score on the construct. Since psychological safety was unreliable, we were unable to test the first hypothesis (Psychological safety is positively related to Lean team performance).

Table 6

*Reliabilities, Means and Standard Deviations per Construct of the Main Study*

| Scale | M | SD | Cronbach's alpha |
|---|---|---|---|
| 1. Conflict Management | 4.63 | 1.16 | .87 |
| 2. Performance Monitoring | 4.60 | 1.16 | .90 |
| 3. Feedback Behavior | 4.93 | .97 | .80 |
| 4. Backup Behavior | 5.53 | .87 | .89 |
| 5. Team Adaptability | 5.25 | .93 | .82 |
| 6. Team Learning | 4.97 | 1.00 | .81 |
| 7. Information Sharing | 5.36 | .84 | .90 |
| 8. Innovation | 5.04 | .94 | .71 |
| 9. Team Leadership | 5.49 | 1.03 | .93 |
| 10. Team Cohesion | 5.50 | .85 | .83 |
| 11. Psychological Safety | 5.24 | .91 | .69 |
| 12. Organizational Goal Commitment | 5.65 | 1.01 | .92 |
| 13. Team Performance, Department Head | 5.13 | 1.04 | .73 |
| 14. Customer Satisfaction , Department Head | 5.16 | .74 | .73 |
| 15. General Leanness, Department Head [a] | 3.30 | 1.05 | .77[a] |
| 16. Team Performance , Team Leader | 5.58 | .97 | .67 |
| 17. General Leanness, Team Leader | 3.45 | .59 | .54[a] |

[a] We calculated Pearsons correlation as the 'general Leanness' scales consisted of two items only.

**Analysis**

All independent variables were measured at the individual level. Nevertheless, since the hypotheses were formulated at the team level, individual ratings on the variables need to be aggregated to the team level. Further, all variables were directed to the team level via the referent-shift consensus composition. In order to check whether data aggregation was justified, we assessed agreement among scores from team members. James (1982) suggested agreement can be assessed measuring two intraclass correlation coefficients (ICCs): ICC (1) and ICC (2). ICC (1) indicates the extent of agreement among ratings from members of the same team, whilst ICC (2) indicates whether teams can be differentiated on the variables of interest (James, 1982). An acceptable range for ICC (1) values is between .00 and .50 (Bliese, 2000). ICC (2) values equal to or higher than .50 are satisfactory, equal to or larger than .70 are good (Klein et al., 2000). Based on the aggregated scores, partial correlations between the variables were measured. Next, a regression analysis is conducted in order to examine the

relation between the independent variables and Lean team performance. Further, we checked for the relation of the variables of interest with the following control variables: Years of working with Lean, educational level, male/female ratio and team size. In order to prevent common method bias, we measured the relation between team members' scores on team dynamics; whilst the output variables were assessed by the department heads and team leaders' scores. Next, we tested for curvilinear relations for main effects of team cohesion on Lean team performance outcomes by including the quadratic term in the regression equation. Finally, we conducted a stepwise regression analysis to examine the hypothesized relations at the individual level, together with questions about the respondent.

## Results

In this chapter, the research questions are addressed, as well as the psychometric qualities of the survey. We begin with reporting the ICC (1) and ICC (2) values for the constructs. Then, normality assumptions for the scales are checked. Next, our hypotheses are tested by respectively performing correlation and regression analysis. Finally, a stepwise regression analysis will be conducted to explore the data at the individual level.

### Inter-team member agreement

Table 7 reports on the ICC (1) and ICC (2) values for the independent variables. For ICC (1), the variables score between .04 and .17. For ICC(2), the following variables score equal to or higher than .50, which makes it appropriate to analyze these variables at the team level: team leadership (.68), team cohesion (.65), feedback behavior (.68), performance monitoring (.62), team learning (.69), innovation (.71), information sharing (.59) and conflict management (.70). Backup behavior (.38) and adaptability (.45) scored below the .50 cut-off point for ICC (2). Hence, these constructs are not analyzed at the team level, which is why we are unable to

test hypotheses 6 (Team adaptability is positively related to Lean team performance) and 10 (An inverted U-relation exists between backup behavior and Lean team performance) (see Table 9).

Table 7

*ICC Values*

| Construct | ICC (1) | ICC (2) |
|---|---|---|
| Team Leadership | .14 | .68 |
| Team Cohesion | .12 | .65 |
| Organizational Goal Commitment | *.07* | .50 |
| Feedback Behavior | .15 | .68 |
| Backup Behavior | *.04* | *.38* |
| Performance Monitoring | .11 | .62 |
| Team Learning | .15 | .69 |
| Innovation | .17 | .71 |
| Information Sharing | .10 | .59 |
| Conflict Management | .15 | .70 |
| Adaptability | *.06* | *.45* |

*Note.* $N = 462$. ICC (1) determines the level of agreement among ratings from team members within the same team. ICC (2) estimates the reliability of mean differences across teams (between group variance).

## Checking normality assumptions

All scales were normally distributed, with skewness and kurtosis ranging between -2.00 and 2.00). Hence, no scales were discarded.

## Correlation Analysis

Means, standard deviations and correlations of the resulting eight aggregated variables are shown in Table 8. The dependent variables 'general performance (department heads' score)', 'general Leanness (department heads' score)' and 'general Leanness (team leaders' score)' did not correlate with the independent variables, which leads us to reject all our team-level linear hypotheses (see Table 9).

However, several of the independent variables are significantly positively correlated (see Table 8). Team leadership positively correlates with team cohesion ($r = .70$, $p < .05$).

Team cohesion positively correlates with organizational goal commitment ($r = .61$, p < .01), innovation ($r = .65$, $p<.01$), information sharing ($r = .48$, $p<.05$), conflict management ($r = .78$, $p<.01$). Organizational goal commitment positively correlates with team cohesion ($r = .58$, $p<.01$), organizational goal commitment ($r = .51$, $p<.05$), information sharing ($r = .51$, $p<.05$), and conflict management ($r = .78$, $p<.01$). Feedback behavior positively correlates with team leadership ($r = .61$, $p<.01$), organizational goal commitment ($r = .79$, $p<.01$), performance monitoring ($r = .65$, $p<.01$), team learning ($r = .48$, $p<.05$), organizational goal commitment ($r = .48$, $p<.05$), innovation ($r = .46$, $p<.05$), information sharing ($r = .49$, $p<.05$), and conflict management ($r = .69$, $p<.01$).

Team learning positively correlates with innovation ($r = .80$, $p<.01$), information sharing ($r = .74$, p<.01), conflict management ($r = .47$, $p<.05$). Conflict management positively correlates with innovation ($r = .64$, $p<.01$), and information sharing ($r = .46$, $p<.05$). The high intercorrelations between the abovementioned predictors may indicate some multicollinearity. Moreover, we found that team performance as rated by the department head is significantly correlating with his ratings on general Leanness ($r = .64$, $p<.01$) and customer satisfaction ($r = .59$, $p<.01$). Further, team leaders' scores on general Leanness significantly correlates with team performance as rated by the department head ($r = .45$, $p<.05$), as well as with department heads' score on customer satisfaction ($r = .45$, $p<.05$). Finally, male/female ratio significantly correlates with conflict management ($r = .53$, $p<.05$).

Table 8

*Means, Standard Deviations, and Correlations, Based on Aggregated Data*

| | M | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Team Leadership | 5.48 | .46 | (.93) | | | | | | | | | | | | | | | | |
| 2. Team Cohesion | 5.49 | .44 | .70** | (.83) | | | | | | | | | | | | | | | |
| 3. Org. Goal Commitment | 5.66 | .41 | .61** | .58** | (.92) | | | | | | | | | | | | | | |
| 4. Feedback Behavior | 4.91 | .50 | .74** | .50* | .79** | (.80) | | | | | | | | | | | | | |
| 5. Performance Monitoring | 4.61 | .60 | .42 | .18 | .47 | .65** | (.91) | | | | | | | | | | | | |
| 6. Team Learning | 5.02 | .54 | .34 | .40 | .48* | .48* | .09 | (.81) | | | | | | | | | | | |
| 7. Innovation | 5.08 | .52 | .40 | .65** | .51* | .46* | -.07 | .80** | (.71) | | | | | | | | | | |
| 8. Information Sharing | 5.41 | .37 | .30 | .48* | .51* | .49* | .17 | .74** | .78** | (.90) | | | | | | | | | |
| 9. Conflict Management | 4.67 | .62 | .73** | .78** | .78** | .69** | .25 | .47* | .64** | .46* | (.87) | | | | | | | | |
| 10. General Leanness (Dep. Heads' Score) [a] | 3.37 | .97 | .17 | .26 | .00 | -.05 | .01 | .12 | .08 | .03 | .10 | (.77) | | | | | | | |
| 11. Customer Satisfaction (Dep. Heads' Score) | 5.07 | .77 | .13 | .13 | .13 | .27 | .18 | .37 | .29 | .14 | .13 | .31 | (.73) | | | | | | |
| 12. Team Performance (Dep. Heads' Score) | 5.17 | .97 | .06 | .18 | .02 | .01 | .02 | .28 | .20 | .13 | -.06 | .64** | .59** | (.73) | | | | | |
| 13. General Leanness (Team Leaders' Score) [a] | 3.51 | .60 | .13 | .11 | .36 | .19 | .26 | .28 | .18 | .00 | .23 | .45* | .45* | .36 | (.54)[b] | | | | |
| 14. Educational Level | 15.00 | 9.55 | .00 | .09 | -.19 | -.36 | -.18 | .09 | -.03 | -.03 | -.10 | .25 | -.22 | .05 | -.16 | - | | | |
| 15. Male/Female Ratio | .60 | .30 | .33 | .23 | .32 | .36 | .22 | -.07 | .04 | -.04 | .53* | .14 | .21 | -.15 | .12 | -.28 | - | | |
| 16. Team Size | 2.30 | .46 | .15 | -.25 | .08 | .18 | .11 | -.34 | -.35 | -.40 | -.09 | -.11 | .26 | -.06 | -.08 | -.32 | .31 | - | |
| 17. Lean Maturity | 28.41 | 3.52 | -.11 | .14 | .19 | .04 | -.17 | .17 | .30 | .21 | -.04 | .16 | .20 | .31 | .20 | -.31 | -.06 | -.15 | - |

*Notes.* Diagonal entries represent scale reliabilities (Cronbach's alphas). $N = 31$ Lean work teams.

Correlations were significant (2 tailed) at the following levels: *$p < .05$; **$p < .01$.

[a] General Leanness was measured on a 5-point scale: all the other non-control variables were assessed on a 7-point scale.

[b] We calculated Pearsons correlation as the 'general Leanness' scale consisted of two items only.

**Curvilinear relationships**

Apart from the expected linear relations, we expected an inverted U-relation between team cohesion and Lean team performance outcomes. We tested for curvilinear relations between team cohesion on the outcome variables team performance (department heads' score), customer satisfaction (department heads' score), general Leanness (department heads' score) and general Leanness (team leaders' score). However, we found no evidence of a relation between team cohesion and team performance outcomes. Hence, hypothesis 2 is rejected.

Table 9

*Overview of the Accepted and Rejected Hypotheses*

| Hypothesis | | Accepted/ rejected |
|---|---|---|
| H1 | Psychological safety is positively related to Lean team performance | rejected |
| H2 | An inverted U-relation exists between team cohesion and Lean team performance | rejected |
| H3 | Team leadership is positively related to Lean team performance | rejected |
| H4 | Organizational goal commitment is positively related to Lean team performance | rejected |
| H5 | Effective conflict management is positively related to Lean team performance | rejected |
| H6 | Team adaptability is positively related to Lean team performance. | rejected |
| H7 | Team learning behavior is positively related to Lean team performance | rejected |
| H8 | Performance monitoring is positively related to Lean team performance | rejected |
| H9 | Feedback behavior is positively related to Lean team performance | rejected |
| H10 | An inverted U-relation exists between backup behavior and Lean team performance | rejected |
| H11 | Innovation is positively related to Lean team performance | rejected |
| H12 | Information sharing is positively related to Lean team performance | rejected |

**Individual-Level Data Exploration**

Since no significant team-level correlations were found between the independent and the dependent variables, we decided to further explore the data at the individual level: by examining the main variables and their relations with Lean team performance outcomes, together with questions about the respondent.

A stepwise regression analysis indicated that at the individual level, team cohesion was predictive of department heads' score of general Leanness ($R^2_{adj}$ = .05, $F(3,303)$ = 5.78, p<.01) ($\beta$ = .13, $t(303)$ = 2.30, $p$ =.02, see Table 12). Further, team leaders' score on general

Leanness was predicted by innovation ($R^2_{adj}$ = .02, $F(1,308)$ = 6.18, p=.01) ($\beta$ = .14, $t(308)$ = 2.49, $p$ =.01, see Table 13). However, the effect size is small (Cohen & Cohen, 1988). Further, we found two control variables to be predictive of Lean team performance outcomes: the number of months working with Lean and educational level. The number of months working with Lean was predictive of department heads' scores on teams' general Leanness ($R^2_{adj}$ = .05, $F(3,303)$ = 5.78, $p$ <.0 1) ($\beta$ = .15, $t(303)$ = 2.62, $p$ <.01, see Table 12), team performance ($R^2_{adj}$ = .12, $F(1,303)$ = 40.76, $p$<.01, see Table 10) ($\beta$ = .35, $t(303)$ = 6.38, $p$ <.01), and customer satisfaction ($R^2_{adj}$ = .03, $F(1,303)$ = 9.20, $p$ <.01) ($\beta$ = .17, $t(303)$ = 3.03, $p$ <.01, see Table 11). Further, *educational level* was predictive of department heads' scores on general Leanness ($R^2_{adj}$ = .05, $F(3,303)$ = 5.78, $p$ <.01) ($\beta$ = .15, $t(303)$ = 2.68, $p$ <.01, see Table 12). However, effect sizes are again small, ranging from .02 to .05 (Cohen & Cohen, 1988). Only the relation between the number of months working with Lean and team performance demonstrated a medium effect size (Cohen & Cohen, 1988).

We also looked at the hypothesized curvilinear relations between backup behavior and team cohesion on Lean team performance outcomes at the individual level. However, the relations were unsignificant.

Table 10

*Summary of Stepwise Regression Analysis for Variables Predicting Department Heads' Score of Team performance (N = 303)*

| Variable | B | SE B | β |
|---|---|---|---|
| Step 1 | | | |
| Months with Lean | .35 | .01 | .35* |

*Note*. $R^2$ = .12 for Step 1 (*p*s < .05). *$p$ < .05.

Table 11

*Summary of Stepwise Regression Analysis for Variables Predicting Department Heads' Score*

*of Customer Satisfaction (N = 303)*

| Variable | B | SE B | β |
|---|---|---|---|
| Step 1 | | | |
| Months with Lean | .00 | .00 | .17* |

*Note.* $R^2$ = .03 for Step 1 (*p*s < .05). *$p$ < .05.

Table 12

*Summary of Stepwise Regression Analysis for Variables Predicting Department Heads' Score*

*of General Leanness (N = 303)*

| Variable | B | SE B | β |
|---|---|---|---|
| Step 1 | | | |
| Months with Lean | .00 | .00 | .13* |
| Step 2 | | | |
| Months with Lean | .01 | .00 | .15* |
| Educational Level | .20 | .08 | .14* |
| Step 3 | | | |
| Months with Lean | .01 | .00 | .15* |
| Educational Level | .21 | .08 | .15* |
| Team Cohesion | .16 | .07 | .13* |

*Note.* $R^2$ = .01 for Step 1; $\Delta R^2$ = .02 for Step 2; $\Delta R^2$ = .02 for Step 2 (*p*s < .05). *$p$ < .05.

Table 13

*Summary of Stepwise Regression Analysis for Variables Predicting Team Leaders' score on*

*General Leanness (N = 308)*

| Variable | B | SE B | β |
|---|---|---|---|
| Step 1 | | | |
| Innovation | .07 | .14 | .14* |

*Note.* $R^2$ = .02 for Step 1 (*p*s < .05). *$p$ < .05.

**Discussion**

In this study, we explored the affective, cognitive and behavioral dynamics within shop-floor Lean teams in relation to their performance. From the individual-level results, it appears that team cohesion and innovation are positively related to shop-floor Lean team performance. On the team level, we found no team dynamics contributing to Lean team performance. Below, we will first discuss why we found no evidence at the team level for the hypothesized relations between the team dynamics identified in our study and Lean team performance outcomes. Then, we will address the found individual-level relations between team dynamics and Lean team performance outcomes.

**Team-Level Relations between Team Dynamics and Lean Team Performance Outcomes**

We did not find significant relations on the team level, which led us to reject all our hypotheses. One explanation for the lack of team-level results stems from the high correlations present between the independent variables, which can point to multicollinearity. Multicollinearity undermines the statistical significance of the independent variables (Allen, 2004). Team effectiveness studies provide an explanation for the high intercorrelation. As argued in the literature review, several of the independent variables are suggested to have a causal relation with each other. For instance, information sharing is considered as an important precondition for team learning to occur (Argote, Gruenfeld, & Naquin, 1999), and is found to lead to higher innovativeness (De Vries, et al., 2006). Further, conflict management is associated with higher team cohesion (Tekleab, et al., 2009). Thus, whilst the variables may not necessarily be conceptually related, it is difficult to examine their combined effects on Lean team performance outcomes. In future research, a solution to this problem would be to eliminate some of the team dynamics we addressed. An alternative explanation

for the high intercorrelations would be that the variables in fact are conceptually related. This would make further research warranted into the uniqueness of each of the team dynamics.

A second explanation for the lack of team-level results stems from our aggregation of the data. Although we aggregated the data, ICC (2) values for conflict management, performance monitoring, feedback behavior, team learning and innovation, team leadership and information sharing and adaptability were moderate. The moderate ICC (2) scores means the correlation between team-level variables is weakened, thereby hindering the detection of team-level relations (Klein, et al., 2000).

The absence of team-level relations might further be caused by a loss of statistical power due to data aggregation in general: Our initial sample of 431 individual responses was aggregated to a much smaller sample of 31 shop-floor teams. Hence, we would welcome larger scale studies into the self-reported Lean team dynamics.

**Individual-Level Explorative Results**

For the individual-level analysis, we looked at the hypothesized relations with Lean team performance outcomes, as well as relations with control variables. From this analysis, some interesting findings were distilled. First of all, we hypothesized an inverted-U relation of team cohesion with Lean team performance. We expected high levels of team cohesion to be detrimental to Lean team performance, as it can cause groupthink (Tekleab, et al., 2009; Van Dun and Wilderom, 2012). However, at the individual level we solely found evidence for a linear relation between team cohesion and department heads' score of general Leanness. This linear relation suggests high cohesion levels do not necessarily lead to groupthink.

Second, we found that team leaders' scores on general Leanness were predicted by innovation. We indeed expected a positive relation between innovation and Lean team performance outcomes; however, we solely found evidence for a relation with general

Leanness. This relation is likely to originate from the fact that CI efforts in a Lean team lead to a high level of change orientation in terms of both CI and innovation (Van Dun and Wilderom; 2012; Bessant, et al., 2001).

The control variable 'number of months working with Lean' was predictive of department heads' scores on teams' general Leanness, team performance and customer satisfaction. This relation sounds logical; a team which works with Lean for a longer period of time is likely to have more Lean experience (Gertsen, 2001). This experience is expected to lead to higher performance by making a greater contribution of Lean to performance (Gertsen, 2001). Further, one principle of Lean is identification of customer value (Hines, et al., 2004). Since teams which work with Lean for a longer period of time have more experience with Lean, they are likely to have a clearer image of customers' needs, which makes it easier to satisfy customers.

Another control variable, educational level, was predictive of department heads' score of general Leanness. This relation poses a striking challenge for Lean teams at the shop-floor level: Whilst at this level, Lean is considered to be especially important (Boer & Gertsen, 2003; Edmondson, Dillon, & Roloff, 2007), the educational level at this level often is lower than in higher organizational levels. Whilst educational level has not been linked to Lean team performance previously, the effective training of Lean team members could be expected to contribute to Lean team performance, based on outcomes from CI, TQM and self-managing team literature. Education basically is a form of training. Kauffeld (2006) showed that the amount of training is positively related to self-managing work team's work-related competence. Further, Ooi et al (2008) found education and training to be an important TQM prerequisite. Bessant et al. (2001) argued different training is required in each CI stage: In the implementation phase, training in basic CI tools is provided. In later Lean phases, more advanced shop-floor team training is in place (Bessant et al., 2001). Closely related to this

point is the fact that in mature Lean teams, individuals "*seek out opportunities for learning / personal development*" (Bessant, et al., 2001, p. 73). A follow-up study might test this proposed relation between training and Lean team performance.

### Limitations

Despite the strengths of some aspects of this study (no common method bias, objective department head scores on team performance, established validity for all measures), the present study also has a number of limitations, which are discussed below.

The 31 teams participating in our study differed in their Lean maturity; however, they all worked with Lean principles, which means they had decided to commit themselves to Lean. This similarity between the teams might give rise to a restriction of range bias. Such bias might have caused a low variability in our data, which makes it harder to detect causal relations between the input and outcome variables (Anastasi, 1976). Therefore, we recommend that in future research, non-Lean teams are studied as well.

Another limitation stems from the use of team members' self-reports for assessing work floor practices. We believe employees must be consulted in determining a firm's Leanness, since Lean principles consider shop-floor employees as most knowledgeable (Bicheno & Holweg, 2009). However, Detert, Schroeder and Mauriel (2000) note that in mature Lean teams, members have a deep-rooted Lean mindset, in which current practices are never viewed as good enough. Perhaps mature Lean team members are more critical when self-rating their team dynamics by means of a survey. Indeed, Emiliani (1998) argues self-awareness is a key Lean team attribute. The high self-awareness in effective Lean teams might have blurred the outcomes. We were able to partially control for this bias since we prepared team-specific reports, which we discussed with each of the individual team leaders and department heads during a face-to-face meeting. During these meetings, we presented the

team-specific outcomes to the team leaders and department heads, and asked them to what extent they thought the survey findings reflected their day-to-day team dynamics. Their positive responses illustrate the ecological or practical validity of our survey instrument. However, in further research, one could further control for this self-awareness bias by adding other scales or research methods to the current survey such as systematic team observation. This would provide a richer dataset on which firmer conclusions can be made.

Another limitation concerns the fact that each organization applies their own bundle of Lean tools (Shah & Ward, 2003). We did not explicitly examine the used tools in each team, whilst perhaps each tool has different effects on Lean team dynamics. However, whilst Lean tools might not be applicable to each context, the principles of Lean are universal and can be applied to many disciplines (Radnor, Walley, Stephens, & Bucci, 2006 ). We therefore assume that creating a Lean culture requires the same team dynamics across industries. However, a follow-up study might want to test this assumption, by controlling for the set of specific Lean tools that had been applied by the focal shop-floor Lean teams.

Our study was of cross-sectional nature. Therefore, we were unable to view how patterns of affective and cognitive states and behavioral dynamics develop over time. Thus, it would be worthwhile to examine the Lean team dynamics in a longitudinal design in order to gain a deeper understanding of them.

A final limitation stems from the potential existence of non-response bias, as we do not have data from those who did not fill in the survey. However, our survey response rate was very high (84%), and we partially controlled for non-response bias by asking team leaders and department heads whether team members who did not fill in the survey differed in certain characteristics/opinions, which was not the case.

**Future research suggestions**

From the discussion and limitations of our study, we already addressed a number of avenues for future research. Below, some additional research directions are included that are unrelated to our discussion and limitations.

In this study, we solely applied team dynamics, or the mediating variables of the IMOI model of team effectiveness to a Lean team setting (Ilgen, et al., 2005). However, in future research it would be interesting to examine the effects of input variables on Lean team performance as well, as these inputs are suggested to greatly affect a Lean team's dynamics (Van Dun and Wilderom, 2012). Input variables that are proposed to be important in a Lean team setting concern higher-level leader support, structural and strategic clarity, human resource policy and resource abundance (see Van Dun and Wilderom, 2012).

Another interesting future research path concerns taking a multilevel approach to testing our hypotheses. Already, we looked at both the individual and team level. However, a multilevel approach would allow for the simultaneous examination of group-level and individual-level factors. For a further reading on multilevel analysis, we refer to Hox and Kreft (1994), Snijders and Bosker (1999), and Kozlowski and Klein (2000).

Finally, our study was conducted in the Netherlands. However, cultural differences are found to be important determinants of behavior (Baum et al., 1993). Therefore, it would be interesting to compare our findings with those from culturally diverse contexts, so as to generate a more general perspective on Lean team dynamics.

**Conclusion**

The aim in our study was to acquire knowledge that would enhance the speed with which teams become and sustain Lean. We chose to focus on the affective, behavioral and cognitive dynamics in such teams, since such studies are scarce. Our study marks a preliminary step in

determining the team dynamics that are important for successful implementation and sustaining of Lean. Whilst our team-level assessment did not lead to any significant relations between the team dynamics and Lean team performance outcomes, we did find some interesting results at the individual level. At this level, it appeared that both team cohesion and innovation significantly contribute to Lean team performance, as well as educational level and the number of months working with Lean.

By integrating Lean theory with the much more established team effectiveness theory, we paved the path for further advancing the Lean team research area. Further, the self-assessment survey and the insights from testing the hypotheses at the individual-level may enrich existing Lean maturity models and self-assessment tools (see e.g., Aloini, et al., 2011; Beale, 2007; Bessant, et al., 2001; Boer, Berger, Chapman, & Gertsen, 2000; Caffyn, 1999; Jørgensen, Boer, & Gertsen, 2003). However, we welcome larger, quantitative, hypotheses-testing studies for exploring team dynamics important for Lean team success. This could be done by means of subjective self-report measures, combined with objective research approaches such as video-analysis or workplace observations. Such a combination would provide richer data on which more solid conclusions could be made.

## Practical implications

Our best practice orientation towards the affective, behavioral and cognitive dynamics of effective Lean teams may help both Lean managers and consultants in creating an effective Lean team culture. We discovered that innovation and team cohesion are likely to contribute to Lean team performance, as well as a higher educational level and the number of months working with Lean. Below, the practical implications of these findings are discussed.

We found that conflict management contributes to Lean team performance. Therefore, Lean team managers and Lean consultants must focus on creating a culture in which conflicts

are dealt with in a productive manner. Previous team-effectiveness research provides guidance for creating such a culture. First of all, teams that open-mindedly discuss their work-related opinions and that are committed to cooperative goals are better capable to constructively handle conflicts (Tjosvold & Tjosvold, 1995). Training of Lean team members may also help in developing cooperative conflict management skills. For instance, such training may include communicating the differences between constructive and destructive conflict management, providing guidelines for recognizing destructive conflict spirals, and openly acknowledging issues (Shaw, Zhu, Duffy, Scott, Shih & Susanto, 2011).

We further found a positive relation between innovation and Lean team performance. In team effectiveness literature, several recommendations can be found regarding the stimulation of team innovation. We expect these recommendations apply to Lean teams as well. First of all, team initiative and experimentation should be rewarded (Vera & Crossan, 2004). Further, managers can influence team improvisation by establishing boundaries and minimal constraints within which team members are free to experiment and take risks (Vera & Crossan, 2004). Lastly, managers and Lean consultants should initiate or encourage the regular reflection on the team's objectives, strategies, and processes in order to create a "*team-level intellectual product that initiates change*" (Drach-Zahavy & Somech, 2001, p. 121).

The relation between educational level and Lean team performance highlights the importance of continuous learning and personal development of Lean team members. Thus, such learning and development must be enabled and stimulated. This can come in the form of a dedicated CI facilitator who organizes Lean education and training (see Jørgensen, Hyland, & Kofoed, 2008). However, managers could encourage learning and development of team members and offer possibilities for training as well. Further, when hiring new team members,

one can -if possible- best hire a higher-educated person, since this is likely to improve Lean team performance.

The developed survey itself also has several possible applications in practice. First of all, survey ratings on the team dynamics can be used as a blueprint for interventions by managers and consultants, which will eventually help Lean teams to improve their effectiveness. Second, survey outcomes can be used as a tool to monitor team dynamics and their development over time. Third, using a self-assessment survey might contribute to shop-floor employee involvement in the Lean implementation process. Such involvement has already been advocated to be key to Lean implementation (Imai, 1997), and increases ownership of Lean-related efforts amongst team members. Further, survey outcomes are a valuable source of feedback for team members. Such feedback may result in learning behavior and goal accomplishment (Kozlowski & Ilgen, 2006). Finally, survey results may clarify differences of opinion regarding behavioral dynamics, which can assist in developing shared insights among Lean team members.

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Appendix I

*Literature Describing Lean Team Dynamics*

| Author | Behavioral dynamics |
|---|---|
| Caffyn (1999, p. 257) | 1. Employees demonstrate awareness and understanding of the organisation's aims and objectives<br><br>2. Individuals and groups use the organization's strategic goals and objectives to focus and prioritize their improvement activities<br>3. The enabling mechanisms (e.g. training, teamwork, methodologies) used to encourage involvement in CI are monitored and developed<br>4. Ongoing assessment ensures that the organization's structure, systems and procedures, and the approach and mechanisms used to develop CI, consistently reinforce and support each other<br>5. Managers at all levels display active commitment to, and leadership of, CI<br>6. Throughout the organization, people engage proactively in incremental improvement<br>7. There is effective working across internal and external boundaries at all levels<br>8. People learn from their own and others' experiences, both positive and negative<br>9. The learning of individuals and groups is captured and deployed<br>10. People are guided by a shared set of cultural values underpinning CI as they go about their everyday work |
| Emiliani (1998, p. 623) | 1. Self-awareness   2. Benevolence   3. Trust<br>4. Humility   5. Consistency   6. Sincerity<br>7. Compassion   8. Generosity   9. Equanimity<br>10. Suspension   11. Patience   12. Objectivity<br>13. Deference   14. Humor   15. Discipline<br>16. Calmness   17. Understanding   18. Rectitude<br>19. Quietude   20. Respect   21. Wisdom<br>22. Reflection   23. Listening   24. Balance<br>25. Honesty   26. Observation |
| Beale (2007, p. 17) | 1. Team working<br>2. Problem-solving<br>3. Employee autonomy/ empowerment<br>4. Participative decision-making<br>5. Multi-skilling/ motivation for skill acquisition<br>6. Job rotation/ labor flexibility<br>7. Volunteering for extra job activities<br>8. Willingness for/attitude towards organizational change |
| Aloini, Martini & Pellegrini (2011, p. 646) | 1. A CI or equivalent formal improvement system (e.g. total productive maintenance) has been introduced to involve all employees in ongoing improvement<br>2. Appropriate organisational mechanisms are used to deploy what has been learned across the organisation<br>3. Before embarking on initial investigation and before implementing a solution, individuals and groups assess the improvements they proposed against strategic objectives to ensure consistency<br>4. Everyone learns from their experiences, both good and bad<br>5. Everyone understands what the company's or their department's strategy, goals and objectives are<br>6. Ideas and suggestions for improvement are responded to in a clearly defined and timely fashion – either implemented or otherwise dealt with<br>7. Improvement activities and results are continually monitored and measured<br>8. Improvement is an integral part of the individuals' or groups' work, not a parallel activity<br>9. Individuals and groups are effectively working across internal (vertical and lateral) and external divisions at all levels<br>10. Individuals and groups at all levels share (make available) their learning from all work and improvement experiences<br>11. Individuals and groups monitor/measure the results of their improvement activity and their impact on strategic or departmental objectives<br>12. Individuals and groups use the organisation's strategy and objectives to focus and prioritise |

their improvement activities
13. Individuals seek out opportunities for learning/personal development (e.g. active experimentation, setting own learning objectives)
14. Managers accept and, where necessary, act on all the learning that takes place
15. Managers at all levels display leadership and active commitment to ongoing improvement
16. Managers lead by example, becoming actively involved in the design and implementation of systematic ongoing improvement
17. Managers support experimentation not by punishing mistakes, but by encouraging learning from them
18. Managers support improvement processes by allocating sufficient time, money, space and other resources
19. Ongoing assessment ensures that the organisation's processes, structure and systems consistently support and reinforce improvement activities
20. People (individuals/groups) initiate and carry through to completion, improvement activities – they participate in the process
21. People and teams ensure that their learning is incorporated into the organisation by making use of the mechanisms provided for that
22. People are oriented towards internal and external customers in their improvement activity
23. People make use of some formal problem finding and solving cycle
24. People understand and feel ownership of the company's processes
25. People use appropriate tools and techniques to support their improvement activities
26. People use measurement to shape the improvement process
27. Relevant improvement activities involve representatives from different operational levels
28. Senior management make available sufficient resources (time, money, personnel) to support the continuing development of the company's improvement system
29. Specific improvement projects are taking place with customers and/or suppliers
30. The organisation articulates and consolidates (captures and shares) the learning of individuals and groups
31. The organisation recognises in formal, but not necessarily financial, ways the contribution of employees to continuous improvement
32. The organisation uses supplier and customer feedback as a means to improving company performance
33. When a major organisational change is planned, its potential impact on the organisation's improvement system is assessed and adjustments are made as necessary
34. When something goes wrong, the natural reaction of people at all levels is to look for reasons why, rather than to blame the individual(s) involved

| Bessant, Caffyn & Gallagher (2001, p. 72) | 'Understanding CI' - the ability to articulate the basic values of CI | •people at all levels demonstrate a shared belief in the value of small steps and that everyone can contribute, by themselves being actively involved in making and recognising incremental improvements.<br>•when something goes wrong the natural reaction of people at all levels is to look for reasons why etc. rather than to blame individual(s).<br>•people make use of some formal problem-finding and solving cycle |
| | 'Getting the CI habit' - the ability to generate sustained involvement in CI | •people use appropriate tools and techniques to support CI<br>•people use measurement to shape the improvement process<br>•people (as individuals and/or groups) initiate and carry through CI activities - they participate in the process<br>•closing the loop - ideas are responded to in a clearly defined and timely fashion - either implemented or otherwise dealt with |
| | 'Focusing CI' - the ability to link CI activities to the strategic goals of the company | •individuals and groups use the organisation's strategic goals and objectives to focus and prioritise improvements everyone understands (i.e. is able to explain) what the company's or department's strategy, goals and objectives are. |

| | |
|---|---|
| | •individuals and groups (e.g. departments, CI teams) assess their proposed changes (before embarking on initial investigation and before implementing a solution) against departmental or company objectives to ensure they are consistent with them.<br>•individuals and groups monitor/measure the results of their improvement activity and the impact it has on strategic or departmental objectives.<br>•CI activities are an integral part of the individual or groups work, not a parallel activity |
| 'Leading the way' - the ability to lead, direct and support the creation and sustaining of CI behaviors | •managers support the CI process through allocation of time, money, space and other resources<br>•managers recognise in formal (but not necessarily financial) ways the contribution of employees to CI<br>•managers lead by example, becoming actively involved in design and implementation of CI<br>•managers support experiment by not punishing mistakes but by encouraging learning from them |
| 'Aligning CI' - the ability to create consistency between CI values and behaviour and the organisational context (structures, procedures, etc.) | •ongoing assessment ensures that the organisation's structure and infrastructure and the CI system consistently support and reinforce each other<br>•the individual/group responsible for designing the CI system design it to fit within the current structure and infrastructure<br>•individuals with responsibility for particular company processes/systems hold ongoing reviews to assess whether these processes/systems and the CI system remain compatible<br>•people with responsibility for the CI system ensure that when a major organisational change is planned its potential impact on the CI system is assessed and adjustments are made as necessary |
| 'Shared problem-solving' - the ability to move CI activity across organisational boundaries | •people co-operate across internal divisions (e.g. cross-functional groups) in CI as well as working in their own areas<br>•people understand and share an holistic view (process understanding and ownership)<br>•people are oriented towards internal and external customers in their CI activity<br>•specific CI projects with outside agencies - customers, suppliers, etc. - are taking place<br>•relevant CI activities involve representatives from different organisational levels |
| 'Continuous improvement of continuous improvement' - the ability to strategically manage the development of CI | •the CI system is continually monitored and developed; a designated individual or group monitors the CI system and measures the incidence (i.e. frequency and location) of CI activity and the results of CI activity.<br>•there is a cyclical planning process whereby (a) the CI system is regularly reviewed and, if necessary, amended (single-loop learning)<br>•there is periodic review of the CI system in relation to the organisation as a whole which may lead to a major regeneration (double-loop learning).<br>•senior management make available sufficient resources (time, money, personnel) to support the ongoing development of the CI system. |
| 'The learning organisation' - generating | •people learn from their experiences, both positive and negative |

| the ability to enable learning to take place and be captured at all levels | •individuals seek out opportunities for learning / personal development (e.g. actively experiment, set their own learning objectives). <br> •individuals and groups at all levels share (make available) their learning from *all* work experiences <br> •the organisation articulates and consolidates (captures and shares) the learning of individuals and groups <br> •managers accept and, where necessary, act on all the learning that takes place <br> •people and teams ensure that their learning is captured by making use of the mechanisms provided for doing so <br> •designated individual(s) use organisational mechanisms to deploy the learning that is captured across the organisation |
| --- | --- |

Appendix II

*Descriptions of the Thirty-One Lean Teams Participating in the Main Study*

| Type of Organization | Main Team Task | Lean Maturity (inmonths) | No. of individual responses | Response rate | Gender | | Employment | |
|---|---|---|---|---|---|---|---|---|
| | | | | | M | F | Full-time | Part-time |
| Production Company | Assembling Lighters | 87 | 7 | 100 | 100 | 0 | 0 | 100 |
| Financial Institution | Assist Clients in Buying Insurances | 26 | 15 | 100 | 31 | 69 | 8 | 92 |
| Production Company | Assembling Multiple Sorts of Products | 6 | 33 | 100 | 94 | 6 | 28 | 72 |
| Production Company | Assembling Multiple Sorts of Products | 6 | 31 | 100 | 97 | 3 | 12 | 88 |
| Production Company | Processing of Orders | 6 | 29 | 100 | 93 | 7 | 19 | 81 |
| Production Company | Assembling of Circuitries | 6 | 14 | 100 | 64 | 36 | 10 | 90 |
| Production Company | Assembling of High-End Electric Razors | 2 | 19 | 100 | 63 | 38 | 8 | 92 |
| Production Company | Assembling of Mid-End Electric Razors | 72 | 20 | 95 | 75 | 25 | 29 | 71 |
| Financial Institution | Providing Financial Advice to Companies | 26 | 9 | 67 | 50 | 50 | 0 | 100 |
| Production Company | Assembling Lighters | 87 | 6 | 83 | 100 | 0 | 20 | 80 |
| Insurance Company | Processing Applications for Pharmaceutical Products | 72 | 13 | 93 | 31 | 69 | 8 | 92 |
| Financial Institution | Client Service Desk, Providing Service to Customers | 59 | 16 | 100 | 53 | 47 | 13 | 87 |
| Financial Institution | Client Service Desk, Management of Implementations | 49 | 6 | 57 | 80 | 20 | 0 | 100 |
| Financial Institution | Account and Payment Processing | 49 | 14 | 81 | 69 | 31 | 31 | 69 |
| Financial Institution | Answering Phone Calls from Customers | 43 | 7 | 63 | 50 | 50 | 17 | 83 |
| Financial Institution | Contact Point for Customers | 29 | 12 | 100 | 50 | 50 | 30 | 70 |
| Financial Institution | Management of Windows Server | 36 | 33 | 70 | 92 | 8 | 4 | 96 |
| Municipality | Assisting civilians concerning their civil registry | 3 | 10 | 60 | 11 | 89 | 25 | 75 |
| Municipality | Assisting civilians concerning their civil registry | 9 | 5 | 27 | 25 | 75 | 0 | 100 |

| Type of Organization | Main Team Task | Lean Maturity (inmonths) | No. of individual responses | Response rate | Gender | | Employment | |
|---|---|---|---|---|---|---|---|---|
| | | | | | M | F | Full-time | Part-time |
| Municipality | Assisting civilians concerning their civil registry | 9 | 9 | 89 | 13 | 88 | 0 | 100 |
| Tax Administrator | Development of New Applications for Filling in Taxes | 4 | 19 | - | 89 | 11 | 28 | 72 |
| Tax Administrator | Business Intelligence | 10 | 8 | - | 100 | 0 | 0 | 100 |
| Tax Administrator | Implementing Continuous Improvement | 6 | 7 | - | 83 | 17 | 0 | 100 |
| Health Insurer | Sending insurance payment demands to customers | 62 | 38 | 86 | 39 | 61 | 15 | 85 |
| Hospital | Assisting in the operating room | 12 | 39 | 68 | 24 | 76 | 9 | 91 |
| Production Company | Attaching wiring to products | 24 | 13 | 89 | 67 | 33 | 17 | 83 |
| Insurance Company | Providing advice and service to private individuals | 6 | 15 | 100 | 29 | 71 | 29 | 71 |
| Financial Institution | Providing Service To Customers | 120 | 18 | 71 | 35 | 65 | 0 | 100 |
| Financial Institution | Advicing And Providing Service For Preferred Banking | 7 | 16 | 100 | 14 | 86 | 14 | 86 |
| Municipality | Social Case Management | 4 | 9 | 58 | 43 | 57 | 0 | 100 |
| Production Company | Processing Of Orders For Various Products | 1 | 14 | 100 | 100 | 0 | 0 | 100 |

*Questionnaire for Team Members and Leaders (Questions Are Arranged Per Construct)*

Vragenlijst over

de manier van werken bij

*<name of the company>*

## UNIVERSITEIT TWENTE.

Welkom, pak een kop koffie en ga even rustig zitten voor deze vragenlijst. We hebben namelijk jouw mening heel erg hard nodig!

Met deze vragenlijst willen we meer te weten komen over het gedrag en de prestaties in uw team. In deze vragenlijst zullen we u daarom hierover een aantal vragen stellen. Op deze manier willen we een beeld vormen over wat er goed gaat, en wat beter kan. Met deze informatie kunnen we de kennis over uw team en andere teams beschrijven zodat anderen er van kunnen leren.

## Het beantwoorden van de vragen

Vrijwel alle vragen kunnen beantwoord worden door het inkleuren van het hokje wat het meeste overeenkomt met uw mening. Er is telkens keuze uit zeven antwoorden, waarvan u er één kunt kiezen. Stel dat u bijvoorbeeld de volgende stelling krijgt:

| | Volledig mee oneens | Mee oneens | Beetje mee oneens | Niet eens/ niet oneens | Beetje mee eens | Mee eens | Volledig mee eens |
|---|---|---|---|---|---|---|---|
| 1. Ik vind mijn huidige werk interessant | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Als u uw huidige werken heel interessant vindt dan bent u het dus volledig eens met de stelling. In dat geval kruist u het rechterhokje aan, zoals hieronder:

| | Volledig mee oneens | Mee oneens | Beetje mee oneens | Niet eens/ niet oneens | Beetje mee eens | Mee eens | Volledig mee eens |
|---|---|---|---|---|---|---|---|
| 1. Ik vind mijn huidige werk interessant | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ■ |

Wanneer u per ongeluk het verkeerde antwoord hebt aangekruist, dan kunt u uw antwoord verbeteren door uw foute antwoord door te kruisen. Dit kan als volgt:

| | Volledig mee oneens | Mee oneens | Beetje mee oneens | Niet eens/ niet oneens | Beetje mee eens | Mee eens | Volledig mee eens |
|---|---|---|---|---|---|---|---|
| 1. Ik vind mijn huidige werk interessant | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ✗ |

Zo gaat het invullen bij de meeste vragen. Bij de rest van de vragen spreekt het invullen voor zichzelf.

## Tot slot van belang

- Het invullen van de vragenlijst duurt ongeveer 25 minuten.
- Het kan zijn dat een vraag niet helemaal op u van toepassing is. Toch willen we u vragen ook deze vragen zo goed en eerlijk mogelijk te beantwoorden en de vragenlijst zo volledig mogelijk in te vullen.
- De vragenlijst is **anoniem**. De resultaten worden op groepsniveau teruggekoppeld. Dit betekent dat niemand te weten kan komen welke antwoorden u heeft gegeven.

**Bij voorbaat heel erg bedankt voor het invullen!**

# 1. Vragen over uw waarden

Hieronder vindt u een lijst met waarden die u belangrijk kunt vinden en toe kunt passen als een richtinggever in uw werk. Sommige van deze waarden zullen belangrijker voor u zijn dan andere (*bijvoorbeeld: u vindt 'eerlijkheid' belangrijker dan 'meegaandheid'*). Geef per waarde aan in hoeverre u deze belangrijk vindt. De schaal loopt van 'zeer onbelangrijk' tot 'uiterst belangrijk' (*Gewoonlijk vindt men niet meer dan twee waarden uiterst belangrijk*).

| | Zeer onbe-langrijk | Onbelang-rijk | Van weinig belang | Enigszins belangrijk | Belangrijk | Zeer belangrijk | Uiterst belangrijk |
|---|---|---|---|---|---|---|---|
| 1. Altruisme (zorgzaamheid, anderen ondersteunen) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 2. Rechtvaardigheid (anderen eerlijk behandelen) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 3. Teamwerk (samenwerking) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 4. Gelijkheid (gelijke kansen voor iedereen) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 5. Experimenteren (nieuwe dingen proberen) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 6. Afwisseling (nieuwigheden en verandering verwelkomen) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 7. Creativiteit (innoveren, denken buiten gebaande paden) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 8. Nieuwsgierigheid (interesses najagen, leergierigheid) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 9. Durf (avontuur zoeken, risico's nemen) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 10. Gehoorzaamheid (verplichtingen nakomen, plichtsgetrouw) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 11. Conformiteit (de regels volgen, aanpassen) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 12. Zelfdiscipline (uzelf kunnen bedwingen) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 13. Traditie (gebruiken in stand houden) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 14. Respect (respect voor oudere medewerkers) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 15. Initiatief (ondernemendheid, vindingrijkheid) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 16. Ambitie (veel ambitie hebben) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 17. Succes (dingen bereiken of volbrengen) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 18. Ruimdenkendheid (mogelijkheden zien, buiten de kaders denken) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 19. Verantwoordelijkheid (afspraak is afspraak, doen wat u zegt) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 20. Klantgerichtheid (u bent pas tevreden als uw klanten tevreden zijn) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 21. Eerlijkheid (de waarheid spreken) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 22. Openhartigheid (mededeelzaamheid, openheid, oprechtheid) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 23. Zelfreflectie (terugkijken op eigen gedrag en groei) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 24. Continu verbeteren (dingen steeds beter doen) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 25. Hulpvaardigheid (u inzetten voor het welzijn van anderen) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 26. Integriteit (integer omgaan met persoonlijke informatie) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 27. Bescheidenheid (niet opscheppen of teveel op de voorgrond treden) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 28. Informatie delen (heldere informatie met elkaar bespreken) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 29. Constructieve feedback (op een opbouwende manier terugkoppeling geven) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| 30. Vertrouwen in mensen (mensen vertrouwen vanaf het eerste moment) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
|---|---|---|---|---|---|---|---|

## 2. Vragen over uw voorkeuren

Onderstaande stellingen staan voor voorkeuren die u in uw werk kunt hebben. Sommige van deze voorkeuren zullen belangrijker voor u zijn dan andere (*bijvoorbeeld: u vindt het belangrijker om goed contact te hebben met collega's dan om afwisseling te hebben in uw werk*). Geef per voorkeur aan in hoeverre u deze belangrijk vindt in uw werk. De gebruikte schaal loopt van 'zeer onbelangrijk' tot 'uiterst belangrijk'.

| | Zeer onbelangrijk | Onbelangrijk | Van weinig belang | Enigszins belangrijk | Belangrijk | Zeer belangrijk | Uiterst belangrijk |
|---|---|---|---|---|---|---|---|
| 1. Onderdeel zijn van uw team | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 2. In praktijk brengen van nieuwe ideeën en suggesties | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 3. Anderen helpen | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 4. Veel veranderingen in mijn baan | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 5. Bezig zijn met oplossingen aandragen voor problemen | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 6. Uw eigen beslissingen nemen | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 7. Een goede relatie hebben met uw collega's | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 8. Vrijheid hebben | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 9. Veel verschillende dingen doen | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 10. Werk waarin u mentaal alert moet zijn | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 11. Uw eigen baas zijn | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 12. Mentale uitdaging | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 13. Bijdragen aan het welzijn van anderen | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 14. Vriendschappen met uw collega's | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 15. De ruimte hebben om nieuwe ideeën in te brengen | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 16. Niet steeds hetzelfde doen | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 17. Het gevoel hebben dat u anderen helpt | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 18. Iets nieuws maken | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

## 3. Vragen over uw teamleider

Nu volgen een aantal stellingen over uw teamleider. Geef per stelling aan in hoeverre u het met ermee eens of oneens bent. De gebruikte schaal loopt van 'volledig mee oneens' tot 'volledig mee eens'.

| | Volledig mee oneens | Mee oneens | Beetje mee oneens | Niet eens/ niet oneens | Beetje mee eens | Mee eens | Volledig mee eens |
|---|---|---|---|---|---|---|---|
| 1. Onze teamleider is blij met de prestaties van de teamleden. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 2. Onze teamleider begrijpt de problemen en behoeften binnen het werk. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 3. Onze teamleider ziet de vermogens van teamleden. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 4. Onze teamleider helpt met werkgerelateerde problemen. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 5. Onze teamleider verdedigt ons, zelfs ten koste van zichzelf. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 6. Onze teamleider doet de juiste dingen. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7. Onze teamleider heeft een goede werkrelatie met ons. | □ | □ | □ | □ | □ | □ | □ |

## 4. Algemene vragen over uw team

Geef aan in hoeverre u het met de volgende stellingen eens of oneens bent.

| | Volledig mee oneens | Mee oneens | Beetje mee oneens | Niet eens/ niet oneens | Beetje mee eens | Mee eens | Volledig mee eens |
|---|---|---|---|---|---|---|---|
| 1. Niemand in ons team zou mij opzettelijk tegenwerken. | □ | □ | □ | □ | □ | □ | □ |
| 2. Ik kan goed overweg met mijn teamleden. | □ | □ | □ | □ | □ | □ | □ |
| 3. Ik ben ontevreden met de toewijding van mijn teamleden aan onze taken. | □ | □ | □ | □ | □ | □ | □ |
| 4. Ik ben toegewijd aan het nastreven van de organisatiedoelen. | □ | □ | □ | □ | □ | □ | □ |
| 5. Het ligt moeilijk om anderen om hulp te vragen in ons team. | □ | □ | □ | □ | □ | □ | □ |
| 6. Teamleden zijn in staat om problemen en moeilijke onderwerpen ter sprake te brengen. | □ | □ | □ | □ | □ | □ | □ |
| 7. Dit team geeft me onvoldoende kansen om mijn eigen prestaties te verbeteren. | □ | □ | □ | □ | □ | □ | □ |
| 8. Het voelt alsof ik deel uitmaak van mijn team. | □ | □ | □ | □ | □ | □ | □ |
| 9. Ik vind mijn team leuk. | □ | □ | □ | □ | □ | □ | □ |
| 10. Als ik in ons team een fout maak, dan wordt dit vaak tegen me gebruikt. | □ | □ | □ | □ | □ | □ | □ |
| 11. Ik geef om het halen van de organisatiedoelstellingen. | □ | □ | □ | □ | □ | □ | □ |
| 12. Als team voelen we ons verbonden doordat we dezelfde teamprestaties nastreven. | □ | □ | □ | □ | □ | □ | □ |
| 13. Het is veilig om een risico te nemen in dit team. | □ | □ | □ | □ | □ | □ | □ |
| 14. Ik ben bevriend met leden van mijn team. | □ | □ | □ | □ | □ | □ | □ |
| 15. Teamleden hebben tegenstrijdige ideeën over wat we als team willen presteren. | □ | □ | □ | □ | □ | □ | □ |
| 16. Mijn unieke vaardigheden en talenten worden gewaardeerd door teamleden. | □ | □ | □ | □ | □ | □ | □ |
| 17. Ik vind het belangrijk om de doelstellingen van onze organisatie te halen. | □ | □ | □ | □ | □ | □ | □ |
| 18. In ons team liggen sommige medewerkers niet goed in de groep omdat ze anders zijn. | □ | □ | □ | □ | □ | □ | □ |

## 5. Controle- en hulpgedrag in uw team

Geef aan in hoeverre u het met de volgende stellingen eens of oneens bent:

| | Volledig mee oneens | Mee oneens | Beetje mee oneens | Niet eens/ niet oneens | Beetje mee eens | Mee eens | Volledig mee eens |
|---|---|---|---|---|---|---|---|
| 1. Teamleden brengen fouten onder de aandacht bij andere teamleden, zonder negatief te zijn. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 2. Teamleden helpen andere teamleden die afwezig zijn geweest. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 3. Teamleden wijzen andere teamleden persoonlijk op hun fouten zonder dat de rest van het team dit merkt. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 4. In dit team gaan we na of iedereen het werk op tijd af heeft. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 5. Teamleden maken regelmatig complimenten over onze resultaten als team. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 6. Teamleden zijn bereid te helpen om werk af te maken dat niet aan henzelf toegewezen was. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 7. In dit team controleren we elkaars werkvoortgang. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 8. Teamleden helpen andere teamleden met hoge werklasten. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 9. In dit team houden we in de gaten of iedereen presteert zoals van hem/haar verwacht wordt. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 10. Teamleden helpen andere teamleden met werkgerelateerde problemen. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 11. Teamleden staan altijd klaar om een helpende hand te bieden aan andere teamleden. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 12. In dit team controleren we of iedereen zijn verplichtingen naar het team nakomt. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 13. Teamleden helpen nieuwe medewerkers met inwerken, zelfs wanneer het hen niet toegewezen is. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 14. Teamleden raden andere teamleden aan om hun eigen werk te controleren op fouten. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 15. In dit team controleren we of iedereen doet wat van hem/haar verwacht wordt. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 16. Teamleden benadrukken expliciet wat er goed gaat in het team. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

# 6. Ontwikkeling in uw team

Geef aan in hoeverre u het met de volgende stellingen eens of oneens bent:

| | Volledig mee oneens | Mee oneens | Beetje mee oneens | Niet eens/ niet oneens | Beetje mee eens | Mee eens | Volledig mee eens |
|---|---|---|---|---|---|---|---|
| 1. We nemen regelmatig de tijd om manieren te bedenken die ons werkproces verbeteren. | □ | □ | □ | □ | □ | □ | □ |
| 2. Ons team zoekt regelmatig nieuwe informatie die ons tot belangrijke veranderingen doet komen. | □ | □ | □ | □ | □ | □ | □ |
| 3. In ons team is er altijd iemand die ervoor zorgt dat we stilstaan bij het werkproces. | □ | □ | □ | □ | □ | □ | □ |
| 4. Mensen in dit team brengen regelmatig punten in ter discussie. | □ | □ | □ | □ | □ | □ | □ |
| 5. We nodigen regelmatig mensen van buiten het team uit om informatie te delen of een discussie met ons te voeren. | □ | □ | □ | □ | □ | □ | □ |
| 6. Ons team probeert regelmatig nieuwe ideeën uit. | □ | □ | □ | □ | □ | □ | □ |
| 7. Ons team zoekt nieuwe manieren om dingen aan te pakken. | □ | □ | □ | □ | □ | □ | □ |
| 8. Als team zijn we creatief in onze werkwijze. | □ | □ | □ | □ | □ | □ | □ |
| 9. Innovatie in ons team wordt gezien als te riskant en wordt vermeden. | □ | □ | □ | □ | □ | □ | □ |
| 10. Teamleden vragen teamgenoten wat zij kunnen, wanneer zij bepaalde vaardigheden willen leren. | □ | □ | □ | □ | □ | □ | □ |
| 11. Als teamleden iets nieuws hebben geleerd, zorgen zij dat andere teamleden dit ook te weten komen. | □ | □ | □ | □ | □ | □ | □ |
| 12. Wanneer iemand in het team iets goed kan, vragen teamleden of die collega het hen ook wil leren. | □ | □ | □ | □ | □ | □ | □ |
| 13. Wanneer teamleden bepaalde kennis nodig hebben, vragen zij anderen in het team daarnaar. | □ | □ | □ | □ | □ | □ | □ |
| 14. Teamleden vertellen andere teamleden regelmatig waar ze mee bezig zijn. | □ | □ | □ | □ | □ | □ | □ |
| 15. Teamleden vinden het belangrijk dat hun collega's in het team weten waar zij mee bezig zijn. | □ | □ | □ | □ | □ | □ | □ |
| 16. Teamleden worden graag geïnformeerd over elkaars' kennis. | □ | □ | □ | □ | □ | □ | □ |
| 17. Informatie die teamleden hebben, delen zij met anderen in het team. | □ | □ | □ | □ | □ | □ | □ |

# 7. Moeilijke situaties in uw team

Geef aan in hoeverre u het met de volgende stellingen eens of oneens bent:

| | Volledig mee oneens | Mee oneens | Beetje mee oneens | Niet eens/ niet oneens | Beetje mee eens | Mee eens | Volledig mee eens |
|---|---|---|---|---|---|---|---|
| 1. Conflicten worden openlijk afgehandeld in ons team. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 2. Als een conflict zich voordoet in ons team, dan nemen de betrokkenen in het conflict onmiddellijk stappen om het op te lossen. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 3. Ons team weet wat het moet doen als zich een conflict voordoet tussen teamleden. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 4. Ons team is in staat om de negatieve gevolgen van conflicten te voorkomen voordat ze plaatsvinden. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 5. Ons team is goed in het voorkomen van problemen. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 6. Ons team is goed in het aanpassen aan veranderingen van hulpmiddelen en werkwijzen. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 7. Als er veranderingen plaatsvinden in de werkroutines en middelen, dan past ons team zich hier snel op aan. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 8. Ons team is goed in het omgaan met noodsituaties, veroorzaakt door bijvoorbeeld ongelukken, problemen met hulpmiddelen en werk, of andere oorzaken die ervoor zorgen dat er tijdelijk veel werk is. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

U krijgt nu een aantal vragen (in plaats van stellingen) over moeilijke situaties in uw team. Geef hierbij aan hoe vaak deze situaties voorkomen, op een schaal lopend van 'nooit' tot 'altijd' (*let op: andere schaal*):

| | Nooit | Zelden | Soms | Regelmatig | Vaak | Bijna altijd | Altijd |
|---|---|---|---|---|---|---|---|
| 1. Hoe vaak is er onenigheid tussen teamleden? | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 2. Hoe vaak zijn er persoonlijke conflicten in uw team? | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 3. Hoe vaak is er spanning tussen teamleden? | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 4. Hoe vaak zijn er emotionele conflicten tussen teamleden? | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 5. Hoe vaak zijn uw teamleden het tijdens het werk oneens over de aanpak? | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 6. Hoe vaak zijn er conflicten over ideeën in uw team? | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 7. Hoe vaak is er conflict over het werk dat u doet in uw team? | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 8. Hoe vaak zijn er meningsverschillen in uw team? | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 9. Hoe vaak zijn er conflicten in uw team over wie wat moet doen? | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 10. Hoe vaak is er conflict in uw team over ieders verantwoordelijkheden? | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 11. Hoe vaak bent u het oneens met de taakverdeling in uw team? | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

## 8. Prestaties van uw team

Geef aan in hoeverre u het met de volgende stellingen eens of oneens bent:

| | Volledig mee oneens | Mee oneens | Beetje mee oneens | Niet eens/ niet oneens | Beetje mee eens | Mee eens | Volledig mee eens |
|---|---|---|---|---|---|---|---|
| 1. We voeren ons werk uit op een manier waar alle teamleden het mee eens zijn. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 2. Ik ben tevreden met de prestaties van ons team. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 3. In de toekomst wil ik ook in dit team blijven werken. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 4. Als team leren we veel. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Vul in de vakjes rechts een cijfer van 1 (zeer slecht) tot 5 (zeer goed) in voor de volgende vragen:

| | |
|---|---|
| Hoe beoordeelt u het niveau van continu verbeteren (=dingen steeds beter doen) binnen uw team? *(schaal van 1 tot 5)* | ............ |
| Hoe beoordeelt u het niveau van klantgerichtheid van uw team? *(schaal van 1 tot 5)* | ............ |
| Hoe beoordeelt u de betrokkenheid van teamleden in het continue verbeterproces? *(schaal van 1 tot 5)* | ............ |

## 9. Biografische vragen

| | |
|---|---|
| Wat is uw geslacht? *(Kruis het juiste vakje aan)* | ☐ Man<br>☐ Vrouw |
| Wat is uw leeftijd ? *(Vul rechts in)* | ........... jaar |
| Hoe lang werkt u bij de <<name of the company>>? *(Vul rechts in)* | ........... jaar |
| Hoe lang werkt u in dit team? *(Vul rechts in)* | ........... jaar |
| Wat is de hoogste opleiding die u heeft afgerond? *(Kruis het juiste vakje aan)* | ☐ LBO<br>☐ MBO<br>☐ HBO<br>☐ Universitair<br>☐ Anders, namelijk:<br>…………......... |
| Wat voor een dienstverband heeft u? *(Kruis het juiste vakje aan)* | ☐ Fulltime<br>☐ Parttime |

| Wat voor aanstelling heeft u? *(Kruis het juiste vakje aan)* | ☐ Tijdelijk |
|---|---|
| 73 | ☐ Permanent |

**Hartelijk bedankt voor het invullen van de vragenlijst!**

Onderstaand heeft u eventueel de ruimte voor opmerkingen, graag in BLOKLETTERS schrijven.

## Opmerkingen

Appendix IV

*Questionnaire for Department Heads*

Vragenlijst over de prestaties van

teams binnen <<Name of the company>>

UNIVERSITEIT TWENTE.

**Welkom bij deze vragenlijst over de prestaties van Lean teams!**

Deze vragenlijst wordt gebruikt in een onderzoek van de Universiteit Twente naar werkwaarden en gedrag in teams, en wat voor effect dit heeft op de prestaties van deze teams. Met deze vragenlijst willen we te weten komen hoe de verschillende teams in uw organisatie presteren, zodat we hier lering uit kunnen trekken.

Enkele puntjes:

• Het invullen duurt ongeveer 5 minuten.

• Uw antwoorden zullen anoniem verwerkt worden.

Bij voorbaat heel erg bedankt voor het invullen!

**1. Geef voor team** <<name of the team>> **aan in hoeverre u het eens bent met de volgende stellingen:**

| | Volledig mee oneens | Mee oneens | Beetje mee oneens | Niet eens/ niet oneens | Beetje mee eens | Mee eens | Volledig mee eens |
|---|---|---|---|---|---|---|---|
| 1. Dit team levert werk van hoge kwaliteit. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 2. Dit team behaalt zijn gestelde prestatiedoelen. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 3. Dit team is productief. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 4. Mensen die werk van dit team ontvangen, zijn daar tevreden over. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 5. In dit team worden regelmatig kritieke kwaliteitsfouten gemaakt. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 6. Mensen die werk van dit team ontvangen geven daar vaak positieve reacties op. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 7. Anderen in het bedrijf die met dit team contact hebben, klagen vaak over hoe ze functioneren. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 8. Mensen die werk van dit team ontvangen zijn tevreden over de snelheid van handelen. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**2. Geef team** <<name of the team>> **een cijfer, lopend van 1 (zeer slecht) tot 5 (zeer goed), voor de volgende vragen:**

| | |
|---|---|
| Hoe beoordeelt u het niveau van continu verbeteren (=dingen steeds beter doen) binnen dit team? *(schaal van 1 tot 5)* | ............ |
| Hoe beoordeelt u het niveau van klantgerichtheid van dit team? *(schaal van 1 tot 5)* | ............ |
| Hoe beoordeelt u de betrokkenheid van teamleden in het continue verbeterproces? *(schaal van 1 tot 5)* | ............ |

# Hartelijk bedankt voor het invullen van de vragenlijst!