

Lean-team effectiveness through leader values and members' informing

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Abstract

Purpose – Although empirical tests of effective lean-team leadership are scarce, leaders are often blamed when lean work-floor initiatives fail. In the present study, a lean-team leader's work values are assumed to affect his or her team members' behaviors and, through them, to attain team effectiveness. Specifically, two of Schwartz *et al.*'s (2012) values clusters (i.e. self-transcendence and conservation) are hypothesized to be linked to team members' degree of information and idea sharing and, in turn, to lean-team effectiveness. The paper aims to report the examination of these hypotheses.

Design/methodology/approach – Survey responses ($n=429$) of both leaders and members of 25 lean-teams in services and manufacturing organizations were aggregated, thereby curbing common-source bias. To test the six hypotheses, structural equation modeling was performed, with bootstrapping, linear regression analyses, and Sobel tests.

Findings – The positive relationship between lean-team effectiveness and leaders' self-transcendence values, and the negative relationship between lean-team effectiveness and leaders' conservation values were partly mediated by information sharing behavior within the team.

Research limitations/implications – Future research must compare the content of effective lean-team values and behaviors to similar non-lean teams.

Practical implications – Appoint lean-team leaders with predominantly self-transcendence rather than conservation values: to promote work-floor sharing of information and lean-team effectiveness.

Originality/value – Human factors associated with effective lean-teams were examined, thereby importing organization-behavioral insights into the operations management literature: with HRM-type implications.

Keywords Team effectiveness, Leadership, Lean management, Work values, Team members' information sharing behavior

Paper type Research paper

1. Introduction

In lean management, worker ideas are implemented to continuously improve work processes and, in turn, customer value (Shah and Ward, 2003, 2007). Yet, many work-floor teams that begin with lean fail to keep improving their work practices and to solve problems on an everyday basis, even after multiple attempts, in some cases, to implement lean (Barnas, 2014; Hines *et al.*, 2004; Scherrer-Rathje *et al.*, 2009). Scholars have studied



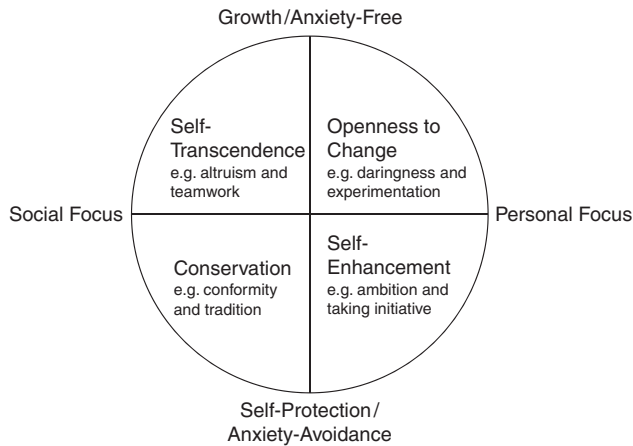
the links between (sets of) lean tools and performance (Bamford *et al.*, 2015; Shah and Ward, 2003). It is known that implementing lean management not only entails workers adopting mechanistic lean tools, such as Kaizen and value stream mapping, it also requires leaders at all organizational levels to change their own mindset and behavior. Those behaviors should be directed at continuous improvement, root-cause analysis, and respect for people, i.e., “lean thinking” (Barnas, 2014; Hines *et al.*, 2004; Mann, 2005; Toussaint, 2015). Most leaders struggle before they reach a lean mindset and more effective leader and lean-team behaviors (Barnas, 2014; Hines *et al.*, 2004; Liker and Hoseus, 2008; Moyano-Fuentes and Sacristán-Díaz, 2012). Despite its resurging popularity, in both the manufacturing and service sector, lean has been associated with higher levels of stress, tension, and anxiety (Conti *et al.*, 2006; Hasle *et al.*, 2012), and conflict (Delbridge, 1995). Thus, in order to help aspiring lean work-floor level teams (or: “lean-teams”), and their leaders, to learn about better work-floor dynamics (Ballé, 2005; Scherrer-Rathje *et al.*, 2009), scholars have urged the study of teams’ micro behaviors and associated work values (Bardi and Schwartz, 2003; Detert *et al.*, 2000; Prajogo and McDermott, 2005). Such “soft” organizational-behavioral analyses at the lean-team work-floor level are still largely absent (Bhamu and Sangwan, 2014; Bortolotti *et al.*, 2015; Samuel *et al.*, 2015; Van Dun and Wilderom, 2012). The present study aims to fill this void.

Following previous research, one can assume effective lean-teams have members whose behaviors are influenced by their team leaders’ values (Bardi and Schwartz, 2003; Canato *et al.*, 2013; Hatch, 1993; Schein, 1990, 1996) as team leaders are seen as key behavioral compasses for the workers they supervise (Cropanzano *et al.*, 1993). This assumption fits the so-called input-process-output (IPO) theory in which there is a need to “generalize leadership effects [i.e. the effect of their values] to the team level [i.e. behavior and team effectiveness]” (Kozlowski and Ilgen, 2006, p. 114). Specifically, Kozlowski and Ilgen (2006) noted that the leadership levers to improve team information sharing need to be refined. Team members’ information sharing has been defined as: “the provision of task information and know-how to help others and to collaborate with others to solve problems, develop new ideas, or implement policies or procedures” (Wang and Noe, 2010, p. 117). Such sharing involves the donating and collecting of ideas, information, or knowledge by members (De Vries *et al.*, 2006; Swift and Virick, 2013). Deichmann and Stam (2015) urged the study of members’ proactive sharing of ideas in relation to leaders’ values. The present study empirically examines two sets of lean-team leader values that are assumed to be associated with team members’ information sharing behavior as well as effectiveness (Sosik, 2005). The manifestation of leaders’ values and such behavior is often assumed to enable lean to thrive (see Alagaraja and Egan, 2013; Fu *et al.*, 2010; Shook, 2010; Van Dun and Wilderom, 2012; Waldman, 1993).

After presenting six hypotheses, this study’s methods and results are reported. The obtained evidence is reflected upon in the Discussion and future research paths are sketched.

2. Theory: team leaders’ values, team-level information sharing, and lean-team effectiveness

Below, relevant operations management literature on lean is paired to parts of Schwartz *et al.*’s (2012) values theory and to Kozlowski and Ilgen’s (2006) IPO model of predicting work-unit effectiveness. Brown and Treviño (2009) adapted Schwartz *et al.*’s (2012) values to work settings; the original four value clusters are: “self-transcendence,” “self-enhancement,” “conservation,” and “openness to change” (see Figure 1). Whereas the self-transcendence cluster entails other-focused values, such as “altruism” and



Source: Adapted from Schwartz *et al.* (2012, p. 669)

Figure 1.
Simplified model
of Schwartz's four
values clusters

“teamwork,” the self-enhancement cluster consists of self-focused values, such as “ambition” and “taking initiative.” The largely change-averse values in the conservation cluster are “conformity” and “tradition,” while the openness to change values entails risk-taking through “experimentation” and “daringness.”

Relatively few scholars have studied managerial values in lean organizations empirically (e.g. Emiliani, 2003), let alone the values of lean-team leaders. In an exploratory study, Van Dun *et al.* (in press) found that effective lean middle managers predominantly espouse self-transcendence values, while not endorsing self-enhancement or conservation values. Five specific values were prevalent among effective lean middle managers: “honesty,” “participation and teamwork,” “candor,” “responsibility,” and “continuous improvement.” Some of these managerial values had been noted in the literature together with: “employee empowerment” and “cooperation” (Jabnoun, 2001; Liker and Convis, 2012; Womack *et al.*, 1990), “continuous improvement” (Emiliani, 2003; Liker and Convis, 2012), “openness,” “responsibility,” “empathy,” and “trust” (Jabnoun, 2001), “respect for people” (Bicheno and Holweg, 2009; Emiliani, 2003; Jabnoun, 2001; Liker and Convis, 2012), “humility” or “humbleness” (Bicheno and Holweg, 2009; Jabnoun, 2001), and “customer focus” (Womack *et al.*, 1990). Most of these values of effective lean managers are clearly others-focused or self-transcendent, but, to date, a systematic empirical study has not been carried out on the specific content of lean-team leaders’ values. The present study focuses on Schwartz’s self-transcendence values cluster because they fit the values ascribed by many authors to effective lean leaders. Self-transcendence values are particularly effective if leaders aim to support their teams rather than control them (Sosik *et al.*, 2009), resulting in higher worker effectiveness (Fu *et al.*, 2010). In fact, various examples note self-transcendence values, such as teamwork and empowering employees as being the core to effective lean (team) leaders (Ballé and Ballé, 2014; Barnas, 2014; Mann, 2005). Also in total quality management (TQM) settings, self-transcendence values, such as teamwork, trust, empowerment, and support, lead to higher levels of member’s job satisfaction (Ooi *et al.*, 2007), which is a known predictor of team effectiveness. Thus:

H1. The more lean-team leaders endorse self-transcendence work values, the higher their teams’ effectiveness.

Leaders who promote lean often engage in transformational leadership practices (Poksinska *et al.*, 2013); they tend to be more forward than backward looking. The advocated continuous improvement requires the elicitation of workers' insights and creativity which presupposes lean leaders have non-conformistic attitudes (Bicheno and Holweg, 2009). Conformistic leaders tend to have values that fit Schwartz *et al.*'s (2012) conservation cluster. However, Schwartz's conservation values are not identical to conservative values and Kosuge *et al.* (2010, p. 8) mention lean has a "paradoxical nature." Lean expects workers "to make significant contributions to innovation and improvement" (Delbridge *et al.*, 2000, p. 1472), while also demanding workers to stick to work standards (i.e. conservation) to maintain quality and efficient product or service flows (Kosuge *et al.*, 2010; Spear and Bowen, 1999). A study at NUMMI demonstrated how lean combines standardized, routine work practices with creative employee participation (Rothenberg, 2003). Lean values, such as "humility" (Bicheno and Holweg, 2009; Jabnoun, 2001), "integrity" (Liker and Hoseus, 2010), and "respect" (Ballé and Ballé, 2014; Bicheno and Holweg, 2009; Emiliani, 2003; Jabnoun, 2001; Liker and Convis, 2012), might be associated with conservation. Consequently, there might be some gains from conservation-oriented leader values in lean work places. However, earlier organizational-level studies found conservative leader values (i.e. stability and predictability) are related to low-lean performance (Zu *et al.*, 2010) and low-financial performance (Sturdivant *et al.*, 1985). Thus, team leaders with conservation values are less likely to advocate change, question the efficiency of long-existing practices, or encourage employees to voice new ideas for improvement, etc. Hence:

H2. The more lean-team leaders endorse conservation work values, the lower their teams' effectiveness.

In addition to the links between lean-team leaders' self-transcendence and conservation values and team effectiveness, this study examines an assumed team behavior engendering the effects. Information sharing is a key behavioral process or "coordinating mechanism" underlying effective teamwork (Salas *et al.*, 2005). Supervisor support is known to predict team information sharing (Ilgen *et al.*, 2005; Kozlowski and Ilgen, 2006; Mesmer-Magnus and DeChurch, 2009; Nonaka, 1994; Swift and Virick, 2013): if team leaders are open and accessible to their employees, they create psychologically safe climates in which members feel welcome to share their ideas and information (Hirak *et al.*, 2012; Wong *et al.*, 2010). A study of project teams showed that the self-transcendence value "benevolence" predicted high levels of group-oriented organizational citizenship behaviors (Arthaud-Day *et al.*, 2012). If team leaders are focused on self-transcendence values such as collaboration and consultation, team members will contribute more ideas for improvement (De Long and Fahey, 2000; Lam *et al.*, 2015). Similarly, high ratings of collectivistic or self-transcendence values are positively linked to work group knowledge sharing (Chen *et al.*, 2011; Wang and Noe, 2010). Hence:

H3. Lean-team leaders' self-transcendence work values are positively related to their team members' information sharing behavior.

While leaders' promotion of cooperation may enhance members' information sharing (Mesmer-Magnus and DeChurch, 2009), such sharing is assumed to drive team performance "by aligning the unique contributions of team members" (DeChurch and Mesmer-Magnus, 2010, p. 35; Ilgen *et al.*, 2005; Mathieu *et al.*, 2008). Team information sharing is an important precondition for team learning (Hines *et al.*, 2004), innovation (Ilgen *et al.*, 2005), and performance (Magnusson and Vinciguerra, 2008), as it exposes

team members to a larger and richer pool of ideas and data so that lean-teams can optimize their processes (Bessant *et al.*, 2001; Bunderson and Boumgarden, 2010; Hines *et al.*, 2004). Also, besides lean contexts, Berson *et al.* (2008) found that CEO self-transcendence values are associated with supportive work contexts which enable members to cooperate and attain higher organizational performance. Sufficient information sharing among team members and the associated team effectiveness may demand from team leaders self-transcendence rather than power-based values (MacNeil, 2004). Hence:

H4. The positive relationship between lean-team leaders' self-transcendence work values and team effectiveness is mediated by the degree of information sharing within the team.

On the other hand, team leaders with conservation values are more likely to protect the status quo and limit member behaviors that might change extant work practices (Schwartz, 1999; Schwartz *et al.*, 2012). De Long and Fahey (2000) found that organizations with low levels of change readiness discourage an open sharing of knowledge. Supervisors who dislike information sharing are likely to fear a reduction of their own power (Karlsson and Åhlström, 1996; Waldman, 1993; Wang and Noe, 2010). Under such conditions, team members are more likely to suppress the sharing of their thoughts and stick to the existing work standards, also in lean-team settings (Delbridge, 1995). Such short-termism has been suggested to be detrimental to TQM (Waldman, 1993). As noted by Nonaka (1994), team leaders should not discourage team discussions. Thus:

H5. Lean-team leaders' conservation work values are negatively related to their team members' information sharing behavior.

It is assumed that if team leaders endorse conservation, lean work teams will score low on information sharing and mistakes will (re)occur more likely. Conservation values emphasize self-restriction (Schwartz *et al.*, 2012) and discourage open sharing of information. This curbs potential performance improvement, manifesting in anti-innovation behavior among teams. It was found that if managers fail to establish a motivational climate, members start to hide information, thereby diminishing their own creativity and inducing a distrust loop (Černe *et al.*, 2014). In turn, this leads to lower production quality or negative team effectiveness (Sturdivant *et al.*, 1985). Hence:

H6. The negative relationship between lean-team leaders' conservation work values and team effectiveness is mediated by the degree of information sharing within the team.

3. Method

3.1 Sample and data collection

All the survey scales were pilot tested on seven lean-team leaders and their members ($n = 77$; 75 percent response rate; $M_{\text{age}} = 42$ years; 58 percent females; 53 percent worked full time). These teams, based in three Dutch organizations with differing production processes, had adopted lean tools for an average of five months. After factor and reliability analyses as well as participants' feedback, redundant items were deleted.

The main study respondents included 34 leaders ($M_{\text{age}} = 42$ years; 26.5 percent females; 94.1 percent worked full time; $M_{\text{team tenure}} = 4.5$ years) and their team members ($n = 395$; $M_{\text{age}} = 41$ years; 34.7 percent females; 71.4 percent worked full time; $M_{\text{team tenure}} = 5.5$ years). The teams in the main study varied in size (ranging from 5 to 44 members), male/female ratio (four teams employed only men; four mostly women), and educational

level (ranging from 31 members with lower vocational education to 19 members with master degrees). The team leader response rate was 97 percent and of the team member sample, 82 percent. Five teams were eliminated from the hypotheses-testing data set because their leaders had not completed the values survey. The 25 remaining teams operated in ten medium- to large-sized organizations in the Netherlands. In all, 15 were service teams in six different organizations (i.e. two financial institutions, two municipalities, an insurance company, and a governmental institution). Their main tasks varied from assisting clients with civil registry, maintaining ICT, or processing insurance claims. Ten teams were from four manufacturing firms; they assembled, e.g., electric razors or lighters, or wired up products. The largest organization employed around 120,000 workers worldwide, while the smallest participating organization employed around 200 workers.

The teams were recruited by means of a public call at lean practitioner seminars, websites, and social media, as well as via management consultants specialized in implementing lean. All the teams had adopted a lean strategy and had installed tools such as employee suggestion systems, communication boards, daily performance monitoring meetings, and value stream mapping (Bicheno and Holweg, 2009; Liker and Hoseus, 2008). The 25 teams had, on average, adopted lean for two years and four months. Two teams had practiced lean for more than seven years.

Team leaders distributed the web links to the team members, giving access to an online, anonymous survey. All respondents were informed that the team leaders could not see who or how many employees had responded. In exchange for their participation, the report of the team-level outcomes was discussed with the team leaders – also to check for the findings' ecological validity.

3.2 Measures and construct validation

The survey consisted of two parts: a section on values, completed by the team leaders; and a part on work team-level information sharing behavior and team effectiveness, completed by the team members. All the English scales were translated into Dutch by an independent expert by means of the standard backward translation method (Brislin, 1970).

3.2.1 Team leaders' work values. Team leaders' work values were assessed with Schwartz *et al.*'s (2012) original and Brown and Treviño's (2009) additional "self-transcendence" and "conservation" scales and supplemented with values from the literature (see Table I). Then a principal axis type of exploratory factor analysis (EFA) was conducted, with oblique rotation (promax) (Fabrigar *et al.*, 1999) because the two values clusters were expected to correlate (Schwartz *et al.*, 2012). Even though the hypotheses stipulate leader values, the data from all the 395 team members were included in this EFA as they had answered the same value questions. The variables in the exploratory values sample ($n = 429$) were adequate for the EFA, as proven by both the Kaiser-Meyer-Olkin measure and Bartlett's test of sphericity ($KMO = 0.89$; $\chi^2_{66df} = 1,426.34$; $p = 0.000$). Six value items were eliminated, because they had double loadings or did not load on any of the factors. Based on the scree plot, the remaining 12 values items consisted of two factors, together explaining 48.73 percent of the variance (see Table I). The near absence of cross-loadings indicated discriminant validity. Similar results were obtained when the promax was compared to a direct oblimin rotation. Hence, building upon Schwartz *et al.*'s (2012) seminal work and upon Brown and Treviño (2009), the EFA supported two valid values measures.

3.2.1.1 Self-transcendence work values cluster. The first factor, self-transcendence, consisted of nine items: three came from Schwartz *et al.*'s and Brown and Treviño's original

Item	Factor 1	Factor 2	h^2
<i>Self-transcendence</i>			
1. Responsibility (a deal is a deal, living up to one's promise)	0.72	-0.17	0.36
2. Integrity (dealing honestly with personal information)	0.70	-0.13	0.37
3. Customer focus (only being satisfied when your customers are satisfied)	0.70	-0.19	0.31
4. Information sharing (discussing clear information with others)	0.61	0.10	0.42
5. Honesty (speaking the truth)	0.56	0.24	0.49
6. Teamwork (working together, cooperation) ⁺	0.54	0.08	0.34
7. Justice (treating others fairly) ⁺	0.51	0.17	0.39
8. Open-heartedness (freely communicative, openness, being genuine)	0.49	0.26	0.44
9. Altruism (caring, assisting others) ^{+,a}	0.34	0.32	0.33
<i>Conservation</i>			
1. Tradition (preserving customs) ⁺	-0.32	0.73	0.18
2. Respect (showing deference to senior employees) ⁺	0.12	0.51	0.28
3. Humility (being humble, staying in the background) ⁺	0.09	0.39	0.17
Eigenvalue	4.52	1.33	
% of variance	37.66	11.07	

Notes: $n = 429$. h^2 , initial communalities coefficient. Principal axis exploratory factor analysis with oblique rotation (promax). ⁺Items marked with this plus sign came from Schwartz *et al.*'s (2012) and Brown and Treviño's (2009) scales; "Because "altruism" is theoretically fundamental to the self-transcendence cluster (Brown and Treviño, 2009; Schwartz *et al.*, 2012), it was decided to keep it in factor 1, despite its cross-loadings. Tests with an eight-item self-transcendence factor attained similar results

Table I.
Lean-team leaders' work values factor pattern matrix

"self-transcendence" scale and six came from the lean values literature (Jabnoun, 2001; Liker and Hoseus, 2010; Van Dun *et al.*, in press). The new scale had a Cronbach's α of 0.81.

3.2.1.2 Conservation work values cluster. The second factor, conservation, included three items from Schwartz *et al.*'s and Brown and Treviño's "conservation" cluster: "tradition," "humility," and "honor." The latter was reworded as "respect," a typical lean value (Bicheno and Holweg, 2009; Emiliani, 2003; Jabnoun, 2001; Liker and Convis, 2012). The reliability of this composite scale was acceptable ($\alpha = 0.69$).

In order to increase respondents' scale distribution and to prevent ceiling effects, the respondents had to first read the values and then pick their single most and least important values from the total list of 12 values (Bardi and Schwartz, 2003). Then, respondents rated each value on a seven-point Likert scale, ranging from 1 = "highly unimportant" to 7 = "highly important."

3.2.2 *Information sharing.* The team-members survey included an eight-item, validated "information sharing" scale (De Vries *et al.*, 2006). Given the team-level of analysis, the scale was rephrased according to the "referent-shift consensus composition" model (Chan, 1998, p. 238). For example, "When I need certain knowledge, I ask my colleagues about it" (De Vries *et al.*, 2006, p. 131) and "When team members need certain knowledge, they ask their colleagues for it." All items were measured through a seven-point Likert scale ranging from 1 = "strongly disagree" to 7 = "strongly agree." The scale showed high reliability ($\alpha = 0.92$).

3.2.3 *Lean-team effectiveness.* Team members had to grade their team's overall effectiveness, including the level of continuous improvement, non-managerial employee involvement, and customer focus – three key lean-team principles (Dean and Bowen, 1994; Morrow, 1997) – on a five-point scale (1 = "lowest" and 5 = "highest"); see Table II for the items used. As this was a newly constructed scale, a principal axis

EFA was ran with all team member data ($n = 395$); it was adequate for the current analysis ($KMO = 0.66$; $\chi^2_{3df} = 304.73$; $p = 0.00$). The scree plot indicated one factor, consisting of these three items (see Table II), that explained 67.57 percent of the variance. This scale had a Cronbach's α of 0.75.

3.2.4 Control variables. Team size, male/female ratio, service/manufacturing sector, and educational level were also assessed, because these variables are seen to impact team behavior such as information sharing (see Aubé *et al.*, 2011; Cohen and Bailey, 1997; Siemsen *et al.*, 2009; Wang and Noe, 2010). As service and manufacturing organizations are considered to be based on different conventions (e.g. Bhamu and Sangwan, 2014; Hadid and Mansouri, 2014; James-Moore and Gibbons, 1997; Leyer and Moormann, 2014), the required team leaders' values and team behaviors may vary.

3.3 Data analysis

Inconsistencies and outliers were checked in both data sets. In order to examine whether data aggregation was justified, intra-team member agreement coefficients, ICC(1) and ICC(2), were calculated, with $k = 13.24$ as the average group size (Castro, 2002; Newman and Sin, 2009). ICC(1) indicates the extent of agreement among the ratings from individual members of the same team. A good ICC(1) ranges between 0.05 and 0.20 (Bliese, 2000; James, 1982). ICC(2) indicates whether the teams can be differentiated in terms of the variables of interest (James, 1982). ICC(2) scores equal to or higher than 0.70 are satisfactory (LeBreton and Senter, 2008). Information sharing roughly met these criteria: ICC(1) = 0.13; ICC(2) = 0.66; $F = 2.64$; $p < 0.01$. Lean-team effectiveness had lower, but acceptable scores: ICC(1) = 0.07; ICC(2) = 0.49; $F = 2.08$; $p < 0.01$. These ICCs must be interpreted with caution as larger teams would have attained better scores (Shrout and Fleiss, 1979). Therefore, $r_{WG(0)}$ scores were also calculated whereby scores between 0.51 and 0.70 indicate moderate interrater agreement (LeBreton and Senter, 2008). Both information sharing and lean-team effectiveness were normally skewed (-0.33 and -0.28 , respectively), leading to a $r_{WG(0)}$ score of 0.52 for information sharing and 0.61 for lean-team effectiveness. It was decided aggregation was justified.

In order to curb common-source bias, each team member's response was randomly assigned to one of two data sets (Rousseau, 1985). One was used to calculate aggregate scores for information sharing. The other was used to calculate aggregate scores for lean-team effectiveness. A two-tailed, paired samples t -test indicated no significant differences between the subset mean scores of information sharing ($t = -1.26$, $p = 0.22$) and lean-team effectiveness ($t = 0.71$, $p = 0.49$). All the aggregated variables showed high reliability and a Shapiro-Wilk test indicated a normal distribution, with skewness ranging between -0.59 and 0.25 , and kurtosis ranging between -0.43 and 0.14 .

Item	Factor 1	h^2
<i>Lean-team effectiveness</i>		
1. How do you grade this team's level of continuous improvement?	0.80	0.44
2. How do you grade this team's level of employee involvement in lean?	0.79	0.44
3. How do you grade this team's level of customer focus?	0.56	0.25
Eigenvalue	2.03	
% of variance	67.57	

Notes: $n = 395$. h^2 , initial communality coefficient. Principal axis exploratory factor analysis with oblique rotation (promax)

Table II.
Lean-team effectiveness factor matrix

In testing the fit of the research model to the data, structural equation modeling (SEM) was conducted through AMOS with maximum likelihood bootstrapping. "Bootstrapping serves as a resampling procedure by which the original sample is considered to represent the population. Multiple subsamples of the same size as the parent sample are then drawn randomly, with replacement, from this population and provide the data for empirical investigation of the variability of parameter estimates and indices of fit" (Byrne, 2010, pp. 330-331). Since bootstrapping does not make distributional assumptions, this method is especially applicable to small samples (Preacher and Selig, 2012). See Byrne (2010) and Arumagam *et al.* (2013) for further instructions of the usage of bootstrapping in an OM context. The reported model fit indices are: χ^2 , comparative fit index (CFI), standardized root mean square of residuals (SRMR), root mean square error of approximation (RMSEA), and RMSEA significance via the PCLOSE or closeness of fit index. Good fit figures are (Byrne, 2010; Hu and Bentler, 1999): CFI if > 0.95 ; SRMR with a maximum of 0.08; RMSEA if < 0.06 ; PCLOSE if > 0.05 . In order to test the hypotheses, linear regression analyses were performed whereby the data were aggregated at the team level. Mediation was tested following Baron and Kenny's (1986) criteria, and the indirect effect of leaders' values on lean-team effectiveness, through team-member information sharing, was analyzed with a Sobel test.

4. Results

The bi-variate correlations, means and standard deviations are presented in Table III. There was a positive significant correlation between team members' information sharing and lean-team effectiveness ($r = 0.67, p < 0.01$), as well as a negative significant correlation between team leaders' conservation values and lean-team effectiveness ($r = -0.38, p < 0.05$). There was also a marginally significant correlation between team leaders' self-transcendence values and team members' information sharing ($r = 0.31, p < 0.10$). A significant, positive correlation existed between team leaders' self-transcendence and conservation values ($r = 0.59, p < 0.01$). The service/manufacturing sector was positively correlated with male/female ratio ($r = 0.67, p < 0.01$) and educational level ($r = 0.62, p < 0.01$).

SEM indicated a good fit on the model including information sharing as a mediator ($\chi^2 = 6.689, df = 8, p = 0.571, CFI = 1.000, SRMR = 0.064, RMSEA = 0.000, PCLOSE = 0.613$). The fit indices are considerably better in comparison to a model without information sharing ($\chi^2 = 12.936, df = 10, p = 0.227, CFI = 0.945, SRMR = 0.081, RMSEA = 0.111, PCLOSE = 0.272$). Thus information sharing is supported as a mediator between team leader values and lean-team effectiveness.

These SEM results were corroborated by two linear regression analyses (see Table IV, as well as the graphical Figure 2), one with information sharing and the other with lean-team effectiveness as the dependent variable; team size, male/female ratio, service/manufacturing sector, and educational level were controlled for. Although leaders' self-transcendence and conservation values were highly correlated, the variance inflation factor (VIF) scores were lower than 2.14, thus showing no evidence of multicollinearity. *H1* anticipated that leader self-transcendence values are positively linked to lean-team effectiveness, as shown in the right-hand column of Table IV ($\beta = 0.75, p < 0.01$). *H2* proposed a negative relationship between leader conservation values and lean-team effectiveness: The data back this hypothesis ($\beta = -0.81, p < 0.01$).

H3 suggested a positive relation between leader self-transcendence values and team members' information sharing. The results support this hypothesis ($\beta = 0.56, p = 0.05$). Then, the mediating effect of the degree of information sharing on the relation between

Variable	Mean	SD	1	2	3	4	5	6	7
1. Self-transcendence	5.86	0.51							
2. Conservation	4.12	1.05	0.59**						
3. Information sharing	5.49	0.44	0.31	-0.09					
4. Lean-team effectiveness	3.86	0.33	0.24	-0.38*	0.67**				
5. Team size	15.56	9.20	0.06	-0.03	-0.14	-0.12			
6. Male/Female ratio	0.60	0.32	-0.15	-0.00	-0.25	-0.20	-0.03		
7. Service/Manufacturing sector	1.60	0.50	-0.11	-0.17	0.15	0.23	-0.11	0.67**	
8. Educational level	2.23	0.47	-0.02	0.13	0.13	0.02	-0.10	-0.29	0.62**

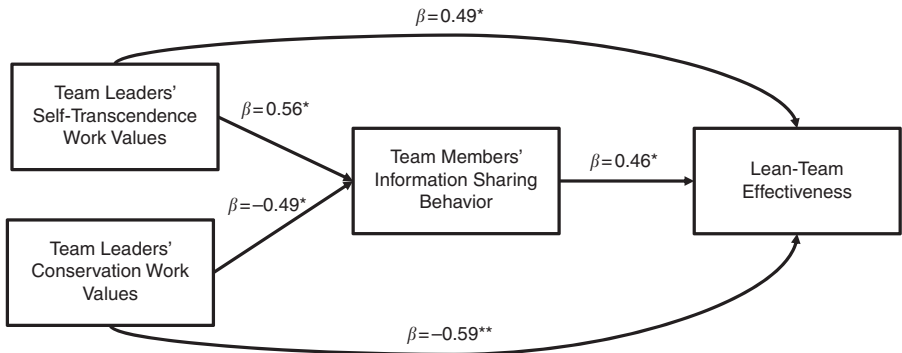
Notes: $n = 25$. Inter-correlations among the dependent and independent variables (no. 1-4) were tested one-tailed; the inter-correlations with the control variables (no. 5-8) were tested two-tailed. * $p < 0.05$, ** $p < 0.01$

Table III.
Summary of descriptive statistics and zero-order correlations

Independent variable	Team members' information sharing behavior		Lean-team effectiveness		
	Step 1	Step 2	Step 1	Step 2	Step 3
<i>Control variables</i>					
Team size	-0.16	-0.19	-0.10	-0.17	-0.08
Male/Female ratio	-0.32	-0.23	-0.06	0.00	0.11
Service/Manufacturing sector	-0.14	-0.20	0.29	0.12	0.21
Educational level	0.11	0.24	-0.19	0.06	-0.05
<i>Team leader values</i>					
Self-transcendence		0.56*		0.75**	0.49*
Conservation		-0.49*		-0.81**	-0.59**
<i>Team members' behavior</i>					
Information sharing					0.46**
df	20	18	20	18	17
R ²	0.09	0.30	0.09	0.54	0.69
ΔR ²	0.09	0.21	0.09	0.45	0.15
F	0.50	1.28	0.48	3.47*	5.28**

Notes: There was no evidence of multicollinearity; none of the variance inflation factors (VIFs) was > 2.14. * $p < 0.05$; ** $p < 0.01$; (one-tailed)

Table IV. Linear regression results for team members' information sharing behavior and lean-team effectiveness



Notes: * $p < 0.05$; ** $p < 0.01$ (one-tailed)

leaders' self-transcendence values and lean-team effectiveness was tested (H4). A significant, positive relationship was found between information sharing and lean-team effectiveness, when controlling for leaders' values ($\beta = 0.46$, $p < 0.05$; see Table IV), which is an important pre-condition. Moreover, the positive relation between leader self-transcendence values and lean-team effectiveness decreased somewhat, but remained significant ($\beta = 0.49$, $p < 0.05$) when information sharing was added to the model, indicating a partial mediation effect. A Sobel test supported a significant indirect effect of team leaders' self-transcendence values on lean-team effectiveness, mediated by the degree of information sharing behavior (Sobel $z = 1.77$, $\beta = 0.25$, $p < 0.05$, see Table V).

Additionally, H5 was supported: The relationship between leaders' conservation values and information sharing was significantly negative ($\beta = -0.49$, $p < 0.05$). On testing H6, it was established that the standardized regression coefficient of

conservation was decreased. Yet, it remained significant when information sharing was added to the model ($\beta = -0.59$, $p < 0.01$, see Table IV), indicating partial mediation. The Sobel test showed marginally significant support for the mediation of information sharing on the relationship between team leaders' conservation values and lean-team effectiveness (H6): Sobel $z = -1.57$, $\beta = -0.22$, $p < 0.06$ (see Table V). Due to the small team sample and the fact that four control variables were included, there were few degrees of freedom. Hence, this study could not show a significant mediation effect. Nevertheless, the marginally significant effect shows a tendency that may be strengthened in larger-sample studies.

5. Discussion

Team leaders' "lean thinking" or espoused values are shown here to be associated with team members' information sharing behavior and, in turn, with lean-team effectiveness. Specifically, this study establishes that leaders' self-transcendence values and team members' information sharing behavior are positively related to lean-team effectiveness, whereas leaders' conservation values are negatively linked to lean-team effectiveness. Information sharing by team members mediates in part the relation between leaders' self-transcendence values and lean-team effectiveness. In other words, beyond a lean toolset (Shah and Ward, 2003), specific leaders' factors (i.e. their values constellations) seem to affect lean-team effectiveness.

The partial mediation effect of team members' information sharing supports Hackman's point that "input factors directly and simultaneously influence both interaction process and performance" (Hackman, 2012, p. 432). The present examination adds to this insight by suggesting that lean-team leaders' values constellations spur team information sharing. The degree of team members' information sharing seems to be a reflection of their leaders' values constellations. Clearly, lean leaders' values are shown to matter to the behaviors of the teams they supervise. Team leaders with self-transcendence values constellations "serve as models for others" and are associated with effective lean-team dynamics (Sagiv and Schwartz, 2007, p. 183; Schein, 1990), i.e., team members seem to "read" their leaders' values constellations (Fu *et al.*, 2010). The partial mediation effect may point towards the importance of other mediating behaviors, such as: conflict management (Delbridge, 1995), coworker support (Swift and Virick, 2013), psychological safety (Siemsen *et al.*, 2009), team cohesion (Mullarkey *et al.*, 1995), team goal orientation (Linderman *et al.*, 2006), improving work practices, and team leaders' actual behaviors (Van Dun and Wilderom, 2012). Future studies of these behaviors must link them to various objective measures of performance, which may lead to an even better integration between organizational behavior and

Parameters	Lean-team effectiveness			
	Bootstrapping Estimate	SE	BC 95% CI Lower	Higher
Leaders' self-transcendence values → Team members' information sharing behavior → Lean-team effectiveness	0.25*	0.15	0.04	0.74
Leaders' conservation values → Team Members' information sharing behavior → Lean-team effectiveness	-0.22**	0.16	-0.70	-0.00

Notes: Pathways are standardized estimates. Maximum likelihood bootstrap on 1000 samples with 95 percent bias-confidence intervals. * $p < 0.05$; ** $p < 0.10$ (one-tailed)

Table V.
Indirect effects with team members' information sharing behavior as a mediator: after bootstrapping

operations management models (Bendoly *et al.*, 2006, 2010; Detert *et al.*, 2000; Linderman *et al.*, 2006; Van Dun and Wilderom, 2012).

In showing the effects of two known clusters of leader values, each supplemented with prototypical lean values, this paper unpicks fragments of effective lean-team cultures (Van Dun and Wilderom, 2012). The few lean-related culture studies have tended to adopt the competing values framework with four opposing culture types: “adhocracy,” “clan,” “market,” and “hierarchy” (e.g. Cameron and Quinn, 2006; Prajogo and McDermott, 2005). Due to a lack of consensus about which of these four types best fit lean organizing (Wagner, 2011), Naor *et al.* (2008) called for entirely new studies with different theoretical frameworks and a link to unit performance. The present study fills this void by showing that a conservation-focused, strict-hierarchical culture is less effective in a lean-team context (similar to what was found by Zu *et al.*, 2010). Leader conservation values that are conceptually related to “hierarchical” values, such as stability and predictability, are negatively related to lean-team effectiveness. In accordance with Zu *et al.* (2010), lean-team leaders are likely to build a “clan culture” through their emphasis on altruistic values and information and idea sharing within their teams.

If managers who supervise team leaders have matching values, it is more tenable that the team leaders’ values will dominate the team dynamics (an effect known as “value transmission,” see Brown and Treviño, 2009). Similarly, values congruence between supervisors and their workers is likely to affect team effectiveness (Brown and Treviño, 2009). Future studies must therefore examine this “cascading effect” (Van Dun and Wilderom, 2015; Yang *et al.*, 2010), including the leaders across entire organizational hierarchies.

5.1 Practical implications

Most managers and consultants tend to start a lean work-floor initiative by installing tools in teams (Shah and Ward, 2003); we show that their efforts are likely to be more effective if they also pay attention to team leaders’ values and team members’ information sharing behaviors. This study’s finding that lean-team leaders with conservation values are less likely to bring about team success, must be taken into consideration by those who select or work with such leaders, i.e., a human-resource approach must be aligned with a leaning-teams strategy (Van Dun and Wilderom, 2012). This is because workers’ sharing of ideas and information is shown to be stimulated by self-transcendence leader values so that team learning and performance improvement may occur (Hult *et al.*, 2003; Ilgen *et al.*, 2005). Thus, we need to take leaders’ (largely invisible) values more seriously, in order to identify potentially effective (and ineffective) leaders of lean-teams.

5.2 Limitations and future research

This study utilizes survey data, collected from both lean-team leaders and their members. Even though the main sample contains a total of 429 respondents (employed by a wide variety of organizations, in terms of size and industry), the sample of 25 Dutch work teams is small. Nevertheless, the hypotheses were supported while attenuating common-source bias. Although the individual team members’ response rate was high, 82 percent, future lean studies need to be conducted with larger team samples across multiple countries (see Roccas and Sagiv, 2010; Sagiv and Schwartz, 2007). Another comparative study is recommended in which similar non-lean work contexts are included: to find to what extent our findings are unique to lean teams.

Due to the present study's cross-sectional design, causality could not be established. An examination of time-lagged links between leader values, their team members' behavior and lean-team effectiveness is recommended. Hence, future longitudinal designs might: integrate the input-mediator-output-input model of team-effectiveness (Ilgen *et al.*, 2005) in order to reveal how members' values and behaviors may change or consolidate over time due to their leaders' adoption of lean values constellations. Examine lean leaders' personal transformation, from a conservation-oriented values set towards more self-transcendence. It might very well be that many leaders have a hard time reaching "lean thinking" because their values are typically stable, deeply ingrained anchors, which are difficult to adjust (Jin and Rounds, 2012). Moreover, field studies could focus on how exactly lean-team information sharing takes place, for instance in specific "improvement kata" (Rother, 2009), and how it boosts precisely lean-team performance. They could include the possible value of small talk or information exchange about seemingly trivial affairs between lean-team members. Such studies could also explore how leaders and team members balance both factual information sharing and subjective exchanges, as well as their information donating and collecting ratios (De Vries *et al.*, 2006) as a function of the strength with which leaders endorse particular values.

Since work-floor workers' perceptions of their own lean-team's effectiveness are rarely examined (Jasti and Kodali, 2014), a scale was designed consisting of three items that are linked to three key lean principles. Employees' perceptions were assessed because the department heads in this study's sample operated too far away from the work floors to be able to validly assess the teams' performance (e.g. Leyer and Moormann, 2014). Ideally, future research should use comparable objective team performance data at various points in time.

The positive and high inter-correlation between the "self-transcendence" and "conservation" values clusters (see Table III) may have caused stronger links between the values and the dependent variable in the regression analysis. However, the VIF scores show that multicollinearity is negligible; this inter-correlation is in line with results of a study performed by Aavik and Allik (2006) who indicated an oblique factor structure among ideal and counter-ideal values. Indeed, the two values scales entail separate factors, yet they are not fully independent (Van Quaquebeke *et al.*, 2014). The present study thus points toward the need of confirmatory factor analysis (CFA). Although this study examined only two of Schwartz *et al.*'s (2012) values clusters, future studies may want to incorporate his full quartet. Follow-up CFA must also pay attention to the specific "altruism" and "humility" items, given their moderate factor loadings in this study. Although humility was classified here by the EFA in the conservation cluster, Schwartz *et al.* (2012) suggested humility may fit both the "conservation" and "self-transcendence" factors. In a lean context, humility should perhaps be interpreted as "a self-protecting value that is grounded in anxiety avoidance" (Schwartz *et al.*, 2012, p. 670). Considering that conservation values are associated here with lower lean-team effectiveness, it may seem that lean leaders should not emphasize humbleness. Lean demands people to voice their ideas for improvement and lean leaders may need to set this example. Intriguingly, this contrasts with earlier results in which humble leaders are effective lean leaders who give their workers room to share ideas (Bicheno and Holweg, 2009; Collins, 2001; Jabnoun, 2001; Owens and Hekman, 2012; Owens *et al.*, 2013; Van Dun *et al.*, in press). Effective leaders seem to paradoxically combine a strong display of vision and humility, whereby leader's humbleness has also been associated with incremental improvement (Collins, 2001; Ou *et al.*, in press; Owens

and Hekman, 2016). Hence, especially considering our modest team-sample size, we must be cautious: larger-scale follow-up research on the beneficial or potentially detrimental team effects of leader humbleness is clearly needed.

6. Conclusion

This multiple-source study shows that lean work teams are more effective when their leaders endorse self-transcendence and reject conservation values while their employees share a lot of information. More research on the human factors on lean work floors is warranted, given also that many other change-management practices pivot on work-floor employees as crucial informants for enhancing organizational or team effectiveness (see e.g. Bicheno and Holweg, 2009; De Lange-Ros and Boer, 2001).

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