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ABSTRACT

This article analyses the effect of perceived lean degree on job satisfaction in back-office environments in the financial services industry. The relationship between perceived lean principles and job satisfaction in general are analysed through an industry-wide survey and a focus on specific aspects of job satisfaction in a case study. The findings show a positive relationship between the perceived lean degree and job satisfaction, and highlight the importance of supervisors' roles, and of keeping the introduction of lean separate from reducing staff. Financial service companies can expect not only efficiency gains but also an increase in job satisfaction for employees perceiving lean management. However, the results point to aspects that should be considered in order to avoid negative effects. In conclusion, increased process efficiency using methodologies such as lean management does not necessarily have a negative effect on job satisfaction, or, thus, on employee well-being.

Introduction

Lean management has, by now, travelled miles away from its cradle of the manufacturing industry to distant lands such as the service sector (Jasti and Kodali 2015). Its philosophy targets waste reduction at all levels of the value chain whilst demanding continuous improvement in attitude and commitment from employees (Womack and Jones 2003). With regard to employees, lean management is the sum of practices performed by employees and their underlying thinking patterns in day-to-day behaviour (Moyano-Fuentes and Sacristan-Diaz 2012).

Though often falsely associated with pure rationalization, automation and outsourcing, lean management rather, at least indirectly, aims to improve employees' perceptions of and affective reactions to value creation, workflow and process-oriented teamwork (Wang and Chen 2010). In fact, employee dissatisfaction can be regarded as waste that disturbs the original value-creation process of the company (Womack and Jones 2003). Studies have indicated that individual and organizational performance is influenced by personal job satisfaction (Harter, Schmidt, and Hayes 2002). This suggests—in spite of previous criticism regarding this influence (e.g. Salancik and Pfeffer 1978)—that employee job satisfaction may eventually lead to increased organizational effectiveness and efficiency (Wood et al. 2012). Additionally, employee well-being at work, and especially the motivational and emotional consequences of a lean working environment, are supposedly linked to customer satisfaction and are of particular relevance to the service industry, where close employee-customer relationships exist (Corrêa et al. 2007).

However, it is unclear how lean management relates to job satisfaction, with mixed results reported in prior literature regarding high-performance work systems in general (García-Chas, Neira-Fontela, and Varela-Neira 2016). Many companies have already adopted lean principles (LPs), or are planning to do so, due to exposure to exceedingly competitive markets (De Koning et al. 2008). The number of employees facing change is probably on the rise, which renders viable psychological research addressing the effects of these management-driven changes all the more desirable (Procter and Radnor 2014). Such a need for relevant research is even more evident if we consider the fact that extant studies have focussed on the increasing adoption of information systems to support lean environments in relation mainly to aspects of efficiency (Bevilacqua, Ciarapica, and Paciarotti 2015), and neglecting employees' satisfaction. So far, no attempt has been made to conduct a seminal integration of theoretical concepts and context applications from both process management and psychology, least of all with specific regard to the financial services industry (Leyer, Vogel, and Moormann 2015).

The research question in this study, therefore, is whether a perceived lean working environment contributes to enhanced employee job satisfaction in a financial services back-office setting. As we assume that employees' perceptions matter most in this context than in others, we are interested in measuring both job satisfaction and perceived lean degree—that is, employees' rating of how they specifically adopt LPs (reflected in eight LPs, as outlined in the theoretical background section) in their workplace in terms of our definition of lean management. Our results regarding this relationship will enhance understanding of the importance

of workplace design (Putnam, Myers, and Gailliard 2014) for job satisfaction. A higher degree of lean application (Hadid and Mansouri 2014) and greater job satisfaction (Judge et al. 2001) are expected to increase organizational performance independently, but it is currently unclear whether perceived lean degree has a negative effect on job satisfaction and is thus targeted in this study.

Theoretical background

Lean thinking

Originally derived from the manufacturing industry in Japan (Ohno 1988), lean philosophy incorporates the idea that a reduction of waste—i.e. activities not directed at creating value or supporting value creation for customers—in organizational processes should be continuously addressed and pursued (Womack and Jones 2003). An activity within an organization creates value when the effort invested in terms of resources such as money, materials or working time is lower than the amount a customer is willing to pay for the results of this activity (Bowen and Youngdahl 1998). Thus, the focus on customers is most important, as products and services should be delivered such that customer needs are addressed in the best possible way, which is expected to lead to the highest willingness to pay (Di Pietro, Mugion, and Renzi 2013). At the same time, every employee in an organization should participate in the continuous improvement of activities necessary to deliver these products and services, with the aim of increasing value (Dahlgaard and Mi Dahlgaard-Park 2006). The core concept of increasing value creation of activities is efficiency—i.e. maximizing the output with a given number of resources or minimizing the input for a given output (Fairris and Tohyama 2002).

Lean management provides a multitude of techniques and tools (e.g. fishbone diagram and 5S) that can help in the continuous improvement of efficiency; however, employees have to think in terms of efficient, value-creating processes in order to apply these tools properly (Rother 2010). Even temporary workers perceive basic tools of lean management as positive when they understand how the tools are embedded in the idea of lean management (Tan et al. 2013). Hence, lean management requires a way of thinking in employees' day-to-day activities that is reflected on implementation, as well as self-awareness, level (Smith 2010; Moyano-Fuentes and Sacristan-Diaz 2012).

On an implementation level, the concept outlines the reduction of process time and costs and aims to simplify operations, enhance workflows and achieve high-quality products based on customer needs (Womack and Jones 2003). On a self-awareness level, lean philosophy explicitly encourages employees to strive for outcome perfection and develop their personal skills (Bhasin 2013). These two levels conceptualize the major principles of lean management (LPs) as follows (Leyer and Moormann 2014):

Implementation level:

(LP1) Understanding customer needs: Employees understand customers' preferences and readiness to spend money on a product or service from their own company (Piercy and Rich 2009).

(LP2) Establishment of value streams: Employees know how the value stream for the creation of a product or service they are involved in is constituted with regard to already identified customer needs (Bowen and Youngdahl 1998).

(LP3) Creating flows within the value streams: Order delays are minimized through the availability of required information at all stages within a value stream (Koskela 1992).

(LP4) Application of the pull approach: Initiation of activities only occurs in response to customer demand or when minimal threshold inventory levels are reached (Hopp and Spearman 2004).

(LP5) Striving for perfect value creation: All activities are designed to eliminate waste and use resources to an optimum so as to constantly increase value creation at every process step (Dahlgaard, Pettersen, and Daahlgaard-Park 2011).

Self-awareness level:

(LP6) Leadership style: The extent to which leaders guide their employees with regard to superordinated, strategic goals set for the company (Jolayemi 2008).

(LP7) Individual responsibility: The degree to which employees assume personal responsibility for their activities, carried out independently or conjointly within a team (Radnor and Johnston 2013).

(LP8) Continuous improvement culture: The organization inherently promotes that employees continuously strive for long-term improvement of all value streams (Bhasin 2011).

These eight principles reflect the concept of a lean degree—i.e. the lean degree of an employee (or, if summarized on a company level, the lean degree of a company) conceptually comprizes these principles. If a company adopts these principles completely, it can be considered as being lean; however, it is unclear whether employees adopt the principles and whether such adoption leads to employees being more satisfied, as lean is mainly focussed on customers and efficiency.

Job satisfaction

Job satisfaction is one of the most studied concepts in work and organizational psychology (Dormann and Zapf 2001). Defined as 'a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences' (Locke 1976, 1304), the construct has been reported to be related to a wide variety of outcome variables; specifically, for example, a moderate-to-weak negative correlation has been found with regard to absenteeism (Steel and Rentsch 1995) and turnover (Griffeth, Hom, and Gaertner 2000).

One of the most influential theoretical approaches in job satisfaction research is the Job Characteristics Model (JCM) (Hackman and Oldham 1975, 1980). This emphasizes the importance of five job dimensions—skill variety, task identity, task significance, autonomy, and feedback—that facilitate

employees' internal work motivation and satisfaction via three critical psychological states: (1) Meaningfulness of the work is experienced when an employee is able to use a number of different skills and talents, instead of performing just one task over and over again. (2) Responsibility for the outcome of the work is experienced when autonomy is high, which occurs when employees are free to determine their work schedules and procedures for carrying work out independently. (3) Knowledge of the actual results of the work is obtained when a feedback structure exists—that is when the employee gains information on how s/he performed on a task and how this outcome eventually affected co-workers or customers.

Influence of lean management on job satisfaction

There exists an extensive literature on psychological aspects at work (and job satisfaction in particular [e.g. Huang and Gamble 2015]). However, these constructs and theories have hardly ever been adapted to or merged with theoretical concepts from the mere process- or management-related research areas. Few studies have linked lean management and job satisfaction theory (Seppälä and Klemola 2004; de Treville and Antonakis 2006; Sterling and Boxall 2013), even though it is more than plausible that employee satisfaction should be taken into account when addressing process redesign in terms of lean management. While Piercy and Rich (2015) found an indirect positive effect in highlighting that lean aims to improve working conditions for employees, Bamford et al. (2015) reported qualitative positive and negative reactions regarding the introduction of lean management. Regarding the service industry in general, only one rigorous study can be found that highlighted the reduction of employee migration as a consequence of applying the lean concept (Laureani and Antony 2010). Furthermore, extensive mutual contact within a team, and a leader who encourages employees to improve their skills, may enhance satisfaction as well (Wood et al. 2012). Moreover, the benefits of a lean environment, such as reducing time wasted, have to be emphasized to employees so that they connect the related satisfaction with lean (Leite, Bateman, and Radnor 2020). On the other hand, however, it is possible that the very same features may evoke discontentment rather than satisfaction; for example, when frequent team interactions or the employee–leader relationship are prone to causing interpersonal dissonance, or when fear arises that efforts at continuous improvement may eventually result in the loss of one's own job (Seppälä and Klemola 2004; Thompson 2011). Moreover, lean implementation can also give rise to conflicts when the professional identity of an employee is between the function (profession) s/he is working in and the processes in which a function is embedded; this embedding is highlighted more in a lean environment (Lindsay, Kumar, and Juleff 2019).

To conclude, employee satisfaction is an important factor within lean management, but adequate empirical evidence regarding the relationship between these two concepts is missing. Following the understanding of lean management as a philosophy, it is important to ask employees whether they perceive their working environment as lean, as well as gauging their respective job satisfaction. Since there is more evidence on positive effects, we hypothesize that:

> H1: The higher the perceived lean degree, the higher employees' job satisfaction.

Delving into the principles of lean, job design in a lean environment includes several aspects that supposedly trigger an individual's internal motivation to do the job—by means of increased autonomy, and thereby enhanced feelings of responsibility, or positive feelings resulting from the experience of flow at work (Csikzsentmihalyi and Rathunde 1998)—in addition to an underlying continuous improvement culture that implies leadership- and team-based support. de Treville and Antonakis (2006) were among the first to actually transfer theoretical concepts of job satisfaction to the lean production context. They stated, for example, that according to the JCM (Hackman and Oldham 1975, 1980), lean production jobs cannot be intrinsically motivating because autonomy is reduced to a minimum in a lean environment—its key concepts being process standardization, focus on flow, teamwork and short cycle times (de Treville and Antonakis 2006, 100). However, their study focussed on the manufacturing context, as have most related studies so far (e.g. Seppälä and Klemola 2004; Bhasin 2011; Sterling and Boxall 2013), while the service sector as a whole, and financial services in particular, remain relatively unaddressed. Only one study has considered aspects regarding a related topic, where a negative influence of work pressure on ill-health complaints in tax processing of a UK government agency was found (Carter et al. 2013).

According to the findings of Harley, Allen, and Sargent (2007) from the aged-care sector, autonomous team membership (LP7) has a positive influence on job satisfaction. Macky and Boxall (2008) found a positive influence of four items that are related to 'individual responsibility' (LP7), 'leadership style' (LP6) and 'establishment of value streams' (LP2). LP7 has the highest relative impact. Regarding 'leadership style' (LP6). It has been highlighted in general that appropriate application by managers of lean ideas is essential for gaining employee support (Seidel et al. 2019). The work of Mohr and Zoghi (2008) covered parts of 'striving for value perfection' (LP5) and 'continuous improvement culture' (LP8) by showing an almost equal positive effect of quality circles and suggestion schemes. Wood et al. (2012) showed that high-involvement management has a negative, and enriched job design has a positive (but much weaker), influence on job satisfaction. Matching both concepts with the LPs, enriched job design covers aspects of 'establishment of value streams' (LP2), 'application of the pull approach' (LP4) and 'individual responsibility' (LP7), while high-involvement management refers to aspects of 'individual responsibility' (LP7) and 'continuous improvement culture' (LP8). A simulation-game study by Rodriguez et al. (2016) found positive effects of job autonomy (LP7) induced by lean techniques on job satisfaction. While the effects of the principles 'understanding customer needs' (LP1) and 'creating flows within the value streams' (LP3) have not been addressed in

prior studies, the few studies that can be found have focussed mainly on individual responsibility (LP7), for which a higher effect than for the other principles can be assumed. Regarding the other principles, it is difficult to determine which ones are most important. Therefore, we hypothesize that:

> H2: The LP 'individual responsibility' is most important, relative to the other LPs, in determining job satisfaction.

Methodology

Participants and procedure

A questionnaire was implemented using an online survey tool and was used to conduct two studies. First, we questioned employees in the German financial services industry with back-office positions, using a non-public university database (the survey data has also been used for another study that answers a different research question [Leyer and Moormann 2014], though the dependent variable has yet to be analyzed). In total, 20,518 back-office employees were surveyed, of which 587 fully completed the items used in this study, leading to a response rate of 2.9%. Second, data were collected via a case study from a German federal state bank after conducting study 1 and getting initial general support for H1. In total, 80 employees of the securities settlement and clearing department answered our online questionnaire (response rate of 81.6%). The department is central within the bank, as it processes transactions from every customer group and securities settlement and clearing departments typically have the most standardized processes in banks. There was no evidence of a prior lean-related project in the bank, which allowed us to rule out effects regarding the resistance or acceptance of a specific project. Employees were informed that participation in the survey was voluntary,

and their answers would remain confidential. Items related to sensitive demographic data and salaries were deleted in advance to ensure anonymity and enhance response rates. The relevant demographics of the participants in both studies are depicted in Table 1.

Measures

To measure our independent variable, perceived lean degree, we adopted the questionnaire from Leyer and Moormann (2014), as this is the only one to have questioned employees regarding their direct work environment. We used the 37 items (five-point Likert scale) of the formative scale (in contrast to reflective scales, formative indicators form the latent variable—i.e. they cause variance in the latent variable [Cenfetelli and Bassellier 2009]) to measure the eight principles specified in 'Methodology'. Thus, the items cover the relevant theoretical aspects of lean management holistically and can be aggregated to measure the lean degree from an individual perspective regarding the work environment, as well as the lean degree of a company if aggregated for a number of employees in a company. Checking the formative scale with the procedure described by Cenfetelli and Bassellier (2009) revealed that items 10 and 13 of the original scale were not significant (LP3), and thus had to be grouped in both studies. Besides this minor adaption, the formative constructs were confirmed and the LPs were found to be robust.

The dependent variable, job satisfaction, was measured in two ways. Within the survey, study 1, we applied a single measure, 'I am very satisfied with my job' on a five-point Likert scale to test the first hypothesis industry-wide. Single measures can be reliable, especially since we aimed to identify a potential influence of lean on the broad construct of satisfaction first, before digging deeper (Bergkvist 2015).

Table 1. Main demographics of the participants.

Study 1					
Position	Employee 65.6%	Team leader 13.2%	Department leader 11.5%	Division leader 6.7%	Board member 3.0%
Functional area	Front office 39.1%	Back office 24.3%	Supporting activities 36.6%		
Allocation of working time (employees)	Operational tasks 33.8%	Administrative tasks 12.3%	Project tasks 19.6%	Coordination with others 13.0%	Leadership tasks 21.3%
Allocation of working time (managers)	Operational tasks 51.9%	Administrative tasks 19.6%	Project tasks 14.7%	Coordination with others 13.9%	
Task complexity (managers)	Simple, structured 18.7%	Complex, structured 20.5%	Simple, unstructured 21.8%	Complex, unstructured 39.0%	
Task complexity (team members)	Simple, structured 27.7%	Complex, structured 24.6%	Simple, unstructured 19.1%	Complex, unstructured 28.5%	
Study 2					
Position	Employee 88.7%	Team leader 10.0%	Department leader 1.3%		
Functional area	Front office 0.0%	Back office 100.0%	Supporting activities 0.0%		
Allocation of working time (managers)	Operational tasks 24.4%	Administrative tasks 6.7%	Project tasks 28.3%	Coordination with others 14.8%	Leadership tasks 25.8%
Allocation of working time (subordinates)	Operational tasks 43.7%	Administrative tasks 16.0%	Project tasks 25.1%	Coordination with others 17.5%	
Task complexity (managers)	Simple, structured 11.9%	Complex, structured 16.3%	Simple, unstructured 20.6%	Complex, unstructured 51.3%	
Task complexity (team members)	Simple, structured 32.1%	Complex, structured 26.5%	Simple, unstructured 15.4%	Complex, unstructured 26.7%	

Indeed, it has been shown empirically that, particularly for job satisfaction, single-item measures are acceptable (Wanous, Reichers, and Hudy 1997).

For the case study, we used specific scales of the Job Diagnostic Survey (JDS) (Hackman and Oldham 1980) to assess employees' job satisfaction. Since lean management focuses on a type of process improvement that implies permanent change, and names employee satisfaction and motivation as additional core elements of its improvement strategy, we consider the JDS an adequate instrument to measure job satisfaction. Unlike other standardized scales related to motivation and well-being, JDS was specifically and solely constructed for application within work environments and based on one of the most widely accepted theories of worker motivation (Pearce and Gregersen 1991). The questionnaire is still applied in a variety of contexts to measure job satisfaction (e.g. Wang, Leung, and Zhou 2014).

Data analysis

Regarding study 1, a linear regression analysis was conducted, as there was only one dependent variable to test for H1. To test for H2, we used the method of relative importance analysis, which allowed us to determine which LP is most responsible for the effect observed (Tonidandel and LeBreton 2011).

To test the hypotheses in study 2, we used partial least squares structural equation modelling (PLS-SEM), as it allowed us to model formative (perceived lean degree) measurement models as well as reflective (job satisfaction) ones (Hair, Ringle, and Sarstedt 2011). We used SmartPLS with 5000 bootstrapping repetitions. Scale validity and reliability were confirmed by applying standard procedures (Hair, Ringle, and Sarstedt 2011). For H1, the sub-scale 'general satisfaction' of the JDS was used as the dependent variable, as the instrument itself does not explicitly allow for an unweighted average across all sub-scales, and items belonging to this scale directly address employees' overall satisfaction with their job. Regarding the post hoc test, we integrated the LPs as individual connections in our model with the respective sub-scales of the JDS as dependent variables next to the perceived lean degree as the overall construct.

Results

Table 2 shows the descriptives and correlations.

Study 1: survey

The results from a linear regression support H1, as there is a significant strong correlation between perceived lean degree ($M = 3.51$; SD = 0.43) and job satisfaction ($t(13.958)$, $p < 0.001$), with a beta-coefficient of 0.503 and an adjusted R^2 of .251. The results of the relative importance analysis support H2, as 'individual responsibility' has the highest weight (Table 3).

The analysis also shows that 'leadership style' is the second-most important construct, followed by 'creating flows within the value streams' and 'understanding customer needs'.

Study 2: case study

The results from the path analysis of the PLS-SEM are shown in Table 4.

H1 is confirmed by the case study as well (0.333, $p < 0.05$). H2 is not confirmed, as the highest (absolute) path coefficient regarding job satisfaction is for 'application of the pull approach' (-0.267, $p < 0.05$), but the highest positive effect is for 'continuous improvement culture' (0.176, $p < 0.05$). Table 4 also shows the results of the post hoc analyses regarding the further dimensions of perceived lean degree and aspects of job satisfaction.

Discussion

Our results show that the lean degree perceived by employees is significantly correlated with their general job satisfaction, as well as with subordinated facets thereof.

Overall, the results show that perceived 'individual responsibility' is a core indicator that is positively related to job satisfaction; despite some contradictory results from Mohr and Zoghi (2008), this finding is in line with prior research that has analyzed partial elements of lean management in employee work design (Macky and Boxall 2008; Harley, Allen, and Sargent 2007; Wood et al. 2012). The result can be explained by the increased responsibility for a broadened range of activities (job enrichment), as experienced meaningfulness and results orientation are higher. At the same time, the application of the pull approach restricts such autonomy, as there is a greater dependency on peers and co-workers. Thus, the negative influence of the pull approach is comprehensible as employees become dependent on customers and colleagues regarding their personal work schedule to perform their activities.

Regarding the continuous improvement culture, the differences in results are notable, as while continuous improvement culture and striving for outcome perfection are closely related concepts (Bhasin 2011), one addresses the operational implementation level whereas the other relates more to how improvement culture is perceived and practised at work. The higher values in the case regarding culture indicate that lean philosophy is already more present among employees within the company or department, but operational key features have not yet been implemented. This is in line with findings from Leyer and Moormann (2014), who revealed that employees' self-awareness level is stronger than the actual degree of implementation, as supported by our findings. Another explanation can be drawn from Seppälä and Klemola (2004), who indicated that concrete actions for quality control on the implementation level lead to reduced possibilities for employee growth and development. Moreover, contrary to the general results found by Thompson (2011) regarding the negative influence of

Table 2. Descriptive statistics and correlations among variables; study 1 (study 2).

	M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) Perceived lean degree	3.51 (3.83)	0.43 (0.35)	—	0.58*** (0.50***)	0.54*** (0.44***)	0.73*** (0.65***)	0.24** (.33*)	0.77*** (0.51***)	0.72*** (0.66***)	0.65*** (0.63***)	0.65*** (0.55***)	0.503** (0.41***)	0.40***	0.42***	0.45***	0.38***	0.35***	0.35**	0.23*	0.51***
(2) Understanding customer needs	3.81 (3.82)	0.81 (0.76)		—	0.35*** (0.20)	0.29*** (0.23*)	0.14** (0.07)	0.30*** (0.13)	0.30*** (0.17)	0.39*** (0.25*)	0.30*** (0.17)	0.30*** (0.25*)	0.17	0.24	0.25*	0.21	0.19	0.05	-0.02	0.25*
(3) Establishment of value streams	3.55 (3.56)	0.57 (0.48)			—	0.31** (0.31**)*	0.01 (0.02)	0.30*** (0.08)	0.27*** (0.23*)	0.35*** (0.28*)	0.26*** (0.15)	0.25*** (0.20)	0.06	0.26	0.40***	0.13	0.24*	0.21	0.19	0.44***
(4) Creating flows within the value streams	3.63 (3.68)	0.57 (0.48)				—	0.12* (0.16)	0.49*** (0.51***)	0.47*** (0.41***)	0.30*** (0.28*)	0.37*** (0.27*)	0.37*** (0.14)	0.18	0.23*	0.19	0.21	0.24*	0.16	0.17	0.31*
(5) Application of the pull approach	2.92 (3.28)	1.06 (1.11)					—	0.13* (0.06)	0.07 (0.15)	-0.03 (-0.13)	-0.02 (-0.16)	-0.05 (0.14)	-0.18	0.09	0.00	0.14	0.00	-0.10	-0.06	0.01
(6) Striving for perfect value creation	3.19 (3.56)	0.62 (0.58)						—	0.46*** (0.32**)	0.37*** (0.19)	0.39*** (0.23*)	0.29*** (0.13)	0.13	0.10	0.17	0.11	0.05	0.03	-0.07	0.14
(7) Leadership style	3.59 (3.81)	0.73 (0.67)							—	0.46*** (0.23*)	0.40*** (0.17)	0.44*** (0.21)	0.36**	0.23*	0.30**	0.33**	0.37**	0.31**	0.39***	0.31**
(8) Individual responsibility	3.95 (4.47)	0.78 (0.64)								—	0.61*** (0.49***)	0.52*** (0.36*)	0.44***	0.28*	0.35**	0.17	0.14	0.37**	0.08	0.44***
(9) Continuous improvement culture	3.50 (3.95)	0.67 (0.56)									—	0.40*** (0.25*)	0.43***	0.30**	0.30**	0.23*	0.28*	0.39***	0.27*	0.35**
(10) General satisfaction	5.63 (4.29)	0.78 (0.51)										—	0.23*	0.16	0.22	0.07	0.12	0.15	0.06	0.37**
(11) Experienced meaningfulness of the work	4.94	1.02											—	0.53***	0.52***	0.43***	0.21	0.48***	0.28*	0.52***
(12) Experienced responsibility for the work	5.74	0.73												—	0.47***	0.53***	0.37***	0.46***	0.27*	0.47***
(13) Knowledge of the actual results of the work activities	5.33	0.85													—	0.26*	0.29**	0.34**	0.15	0.52***
(14) Internal work motivation	5.32	0.97														—	0.22	0.25*	0.22*	0.19
(15) Satisfaction with job security	5.13	1.02															—	0.43***	0.39***	0.45***
(16) Satisfaction with peers and co-workers	5.33	0.94																—	0.66***	0.57***
(17) Satisfaction with supervision	5.53	1.14																	—	0.41***
(18) Satisfaction with opportunity for personal growth and development	5.18	1.07																		—

$N = 101$; M: mean; SD: standard deviation; Pearson correlations; *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$; two-tailed test.

Table 3. Results from regression analysis Study 1.

	General satisfaction Standardized regression coefficients	Relative importance analysis weights
Understanding customer needs	0.087*	8.56*
Establishment of value streams	0.009	4.36
Creating flows within the value streams	0.163***	13.60*
Application of the pull approach	−0.084*	1.71
Striving for perfect value creation	−0.039	4.58
Leadership style	0.197***	20.86*
Individual responsibility	0.335***	33.96*
Continuous improvement culture	0.038	12.37

$*p < 0.05$; $***p < 0.001$.

continuous improvement aspects on job security, we observed not a negative, but rather a positive impact. This result can be explained in combination with the positive influence of established value streams and leadership style, which create a well-defined and adequately supported workplace environment. The workplace atmosphere is open to changes, but employees feel well informed and can better estimate the consequences of changes. Regarding the negative influences, flows within the value stream create an environment in which individual employees are easy to replace (Koskela 1992), and as such also raises fears regarding job security.

The slightly positive results in the case regarding the establishment of value streams confirm and extend those of Macky and Boxall (2008) and Wood et al. (2012), who analyzed several aspects of this principle. This result is driven by an influence on employees' knowledge of the results of their work outcomes, and on their growth satisfaction. Since lean philosophy implies both an awareness of one's own role within the process chain and knowledge of the usefulness of one's work to customers, this is a fascinating result, as it might indicate that lean thinking is not only present within people's work environments, but also contributes to employees' expectations of and satisfaction with personal growth within such environments. Contrastingly, it seems that lean thinking is associated with releasing staff—i.e. reducing overcapacity due to inaccurate scheduling. Such a connection should be avoided in order to increase the positive effect of lean—i.e. other tasks should be identified for employees.

Another interesting finding is that the leadership style has a positive effect on employees' satisfaction with supervision, whilst individual responsibility has a simultaneous negative influence. This result demonstrates the positive effect of leadership in line with the lean approach (Jolayemi 2008) but also highlights that managers in our sample had not yet adopted an understanding of subordinates' increased responsibility. Both must go hand in hand to ensure adequate working conditions. However, while managers have to support their subordinates in subordinates' daily work, they must avoid micromanagement, which is not easy to balance.

Overall, lean thinking and adopting principles on the self-awareness level of lean management seem to be in line with enhanced employee job satisfaction. However, some differences between the industry-wide survey and the case study highlight problems in specific implementations, which are mainly associated with a connection between lean and employee dismissals, and the importance of competent supervisors.

Conclusion

This is the first article to investigate the relationship between a company's perceived lean degree and employee job satisfaction. As such, it places particular emphasis on the role of the individual in process improvement and provides insights into the nature of lean implementation, as well as philosophy transfer to a financial services setting.

As pointed out above, lean management is a philosophy that must be adopted into employees' way of thinking, and thus behaviour (Vijaya Sunder, Mahalingam, and Sai Nikhil Krishna 2019). In contrast to studies that have reported on the application of lean techniques (e.g. Bamford et al. 2015) and their effect on efficiency, the focus on the perceived lean degree and its dimensions enable measurement of whether an individual employee adopts lean thinking. Rodriguez et al. (2016) addressed this in their simulation game by applying several lean techniques that led to a variance in perceived job autonomy and then tested for the impact on job satisfaction. Possible reasons for differences between employees, even those working closely together, might include variations in personal abilities or interest in participating (e.g. Lok et al. 2005; Lam, O'Donnell, and Robertson 2015). Hence, there is a gap between the official implementation of lean management and subsequent techniques, and its adoption, which becomes evident when measuring the perceived lean degree. This must be considered when comparing our results with those of other studies measuring implemented techniques.

Theoretical contributions

Our results extend the literature on production planning and control with regard to the importance of workplace design (Putnam, Myers, and Gailliard 2014) on job satisfaction (Judge et al. 2001) in terms of lean application (Hadid and Mansouri 2014). Prior research has been limited to certain practices of workplace design, for which a predominantly positive effect has been found, which we confirm for the comprehensive concept of perceived lean degree from an individual perspective. The application of lean management is largely positive for employees, as it increases their satisfaction with the meaningfulness of outcomes, job security, leadership, and personal growth opportunities.

In addition, we highlight the relative importance of LPs on job satisfaction. Thus, we extend findings that have been limited to certain aspects of lean (e.g. Macky and Boxall

Table 4. Coefficients and significance level based on the observations referring to the case study, N = 80.

	General satisfaction	Experienced meaningfulness of the work	Experienced responsibility for the work	Knowledge of the actual results of the work activities	Internal work motivation	Satisfaction with job security	Satisfaction with peers and co-workers	Satisfaction with supervision	Satisfaction with opportunity for personal growth and development
Perceived lean degree	0.333*	−0.095	0.434**	0.595***	0.106	0.291*	−0.062	0.111***	0.308*
Understanding customer needs	−0.081**	0.097**	0.023	0.036	0.034	0.023	−0.207	−0.134**	0.001
Establishment of value streams	0.070*	0.027	0.199***	0.264***	0.181**	0.149**	0.133	0.099*	0.228***
Creating flows within the value streams	0.052	0.040	0.133**	0.105*	0.066	−0.112*	0.028	−0.008	0.040
Application of the pull approach	−0.267***	−0.089**	0.201***	0.250	0.004*	−0.104	−0.089**	−0.195	−0.058
Striving for perfect value creation	0.046	−0.036	0.140**	0.291**	−0.026	−0.012	0.083	0.027	−0.192**
Leadership style	0.081	0.190***	0.232***	0.193**	0.238***	0.268***	0.126*	0.461***	0.063
Individual responsibility	0.170*	0.342***	0.401***	0.391***	−0.040	−0.207**	0.159**	−0.177*	0.183*
Continuous improvement culture	0.176*	0.223***	0.257**	0.303***	0.057	0.112**	0.123**	0.060	0.081*

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

2008), as we analyze the sum of perceived workplace design aspects associated with lean management. This also led to the first report on the influence of the pull principle and understanding customer needs, as neither has been reported by prior work analyzing partial aspects in the workplace design of these principles.

Finally, we contribute to prior literature by showing that there are negative effects regarding individual aspects of lean and job satisfaction.

Practical implications

The main practical implication of our results is that introducing lean and achieving a higher perceived lean degree among employees not only increases efficiency and profitability, as shown in other studies (Leyer, Vogel, and Moormann 2015), but is also positively associated with job satisfaction. As there is often a gap between intended implementation and individual adoption, special emphasis should be put on using the additional positive effect of job satisfaction on efficiency to close this gap, particularly for LP3, LP6 and LP7. At the same time, solid implementation is particularly crucial, as a discrepancy between lean thinking and process reality may even contribute to employees'—and thereby, eventually, customers'—dissatisfaction in the long run. In addition, negative effects such as the 'application of the pull approach' and 'understanding customer needs' on satisfaction with supervision, and 'individual responsibility' on satisfaction with job security, should be mitigated via other accompanying actions. This includes communicating that the introduction of lean and the release of employees are separate topics.

Limitations and future research

Our study is characterized by limitations that suggest future research opportunities. First, both studies used measurements taken at a single point in time. Therefore, a statistical implication is that only limited insights into the causal relationship between both constructs were obtained. Hence, it is necessary to dive deeper into the psychological consequences of perceiving lean, especially over longer time periods. Additionally, field study designs that mirror the process chain as a whole—starting with the first employee and his/her work environment and tracing the perceptions of every person involved, all the way down to the end customer—should be taken into consideration, as an extensive and accurate measurement of the consequences of change initiatives is highly needed. Thereby, individual performance, as well as 'group' performance (in a process-oriented, rather than a functional, way), should be assessed within financial services settings alongside an in-depth analysis of moderators for the potential individual- versus 'group'-level differences. Second, covariates such as salaries and personal dispositions, and basic demographics such as age and gender, could not be assessed for privacy reasons. However, incorporating such aspects would enable an analysis of the role of personal abilities and interests. Third, our results are

limited to the financial services industry and should be extended to other service industries such as healthcare and call centres. Fourth, the detailed analysis was taken from a single case and shows differences compared to average back-office results in the industry. To overcome this limitation, the analysis should be repeated with data from other companies. Fifth, job satisfaction in study 1 was measured only with a single item, which prevented a detailed analysis of the construct, as demonstrated in study 2. Moreover, single items might suffer from common-method variance and measurement errors. This is an ongoing debate, as documented by Bergkvist (2015). Though this author has shown repeatedly, with empirical evidence, that single item can be reliable, our use of this approach should nevertheless be considered a limitation as the discussion is ongoing. Sixth, the data stems from German companies and the results can be compared to companies in other similarly characterized countries using, for instance, the well-established cultural dimensions posited by Hofstede, Hofstede, and Minkov (2010). Hence, further studies should consider companies in other countries with different characterizations of cultural dimensions.

Disclosure statement

No potential conflict of interest was reported by the authors.

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