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Employee Motivation to Adopt Lean Behaviours: Individual-level Antecedents

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ABSTRACT

Little research has explored what determines the employee motivation argued to be essential for successful implementation of Lean manufacturing practices. The paper explores the impact of various individual-level factors (job-related, personality-related and demographic) on reported employee willingness to adopt Lean behaviors. Interview, focus group (n=38) and survey data (n=331) collected from employees in a manufacturing firm initiating Lean change suggests that motivation for Lean is directly influenced by employee attitudes, and their perceived ability and the perceived social pressures to adopt Lean behaviors. Indirect antecedents include self-efficacy, job satisfaction, organizational commitment and organizational level. The findings carry important practical implications. Through carefully designed communication and training programs, it should be possible to manage employee motivation for and receptiveness to Lean. The paper concludes with some discussion on future research avenues.

KEYWORDS Lean behaviors; employee motivation; attitudes; perceptions; communication; training

1. Background and Motivation

1.1. Introduction

To successfully compete in the current fierce, global economy, many manufacturers are introducing change initiatives aimed at making their businesses more competitive, responsive and sustainable. The introduction of Lean manufacturing practices is one

of the most popular change initiatives of the current day and is characterized by waste elimination, customer value, material/product flow and continuous improvement (Womack, Jones and Roos, 1990). Practitioners and academics have tended to view the initiation of Lean change through a 'tools and techniques' and process lens, paying comparatively little attention to what a number of authors argue lies at the heart of successful and sustainable Lean change – employee motivation and commitment (Womack, Jones and Roos, 1990; Sawhney & Chason, 2005; Forrester, 1995; Shadur et al., 1995; Fiume, 2004; Emiliani, 1998).

The current study addresses this important yet largely neglected aspect of Lean implementation by drawing on the organizational behavior and occupational psychology literatures. It explores, using interview, focus group and survey data collected from employees in a manufacturing firm initiating Lean change, the impact of a wide range of individual-level factors (attitudes, organizational commitment, job satisfaction, personality traits, gender, age) on employee willingness to adopt Lean behaviors. The practical implications of the findings and future research avenues are discussed.

1.2. A brief overview of Lean

Lean Production (LP) was a term coined by Womack and colleagues (1990) to describe the Toyota Production System (TPS) because it uses less of every major business input (raw materials, time, manpower). The TPS rejects the mass production batch-and-queue approach in favor of Just-in-time production and integrates this with popular techniques including Total Quality Management, Continuous Improvement and Team Working. The result is an efficient, reliable, flexible, and cost-effective

manufacturing system highly capable of handling competitive market conditions (Shingo, 1988; Ohno, 1988; Womack and Jones, 1996).

One of the most important differences between traditional manufacturing systems and lean systems centers on the behaviors and roles employees are expected to adopt (Krafcik, 1988). Unlike conventional hierarchical command-and-control structures, lean HR policies and practices reinforce employee empowerment. Employees from shopfloor to management are encouraged to engage in continuous improvement activities aimed at eliminating waste (suggestion schemes, quality circles) and to get involved in the proactive aspects of production (problem-solving, target-setting, decision-making). To develop employee appreciation for the manufacturing process and customer value, multi-skilling, job rotation and cross-functional teamworking are encouraged.

Since its advent, Lean has transformed the manufacturing world, demonstrating a remarkable ability to improve the quality, productivity and lead times of manufacturing companies in many different industry sectors (Liker, 2004; Womack et al, 1990; Krafcik, 1988; Fujimoto, 1999; Wood, Stride, Wall & Clegg., 2004). It currently represents, as Womack et al (1990) predicted, the standard manufacturing approach of the 21st century with as many as 50% of UK-owned and 85% of US-owned firms applying Lean techniques in at least part of their business (EEF Productivity Survey, 2001).

1.3. People – an essential but neglected aspect of initiating Lean change

The mass of research on Lean business systems and current Lean practice are predominantly process-driven, focusing on the application of tools and techniques. There has been relatively little research on the human dimensions of Lean (Hines, Holweg & Rich, 2004), specifically employee motivation for Lean. Acknowledged, there are studies on the impact of lean practices on employee attitudes, experiences and well-being (Delbridge, 1995; Conti, Angelis, Cooper, Faragher & Gill, 2006; Jackson and Mullarkey, 2000; Jackson and Martin, 1996, Seppala & Klemola, 2004; Parker, 2003), but little research has investigated the individual-level factors underlying employee willingness to assume a lean approach to work.

This is surprising given the mass of evidence emphasizing the importance of employee commitment and motivation for implementation success (Bessant et al, 2003; Coyle-Shapiro and Morrow, 2003; Guimaraes, 1999; Lowe et al., 1997; Shadur et al., 1999), sustainable organizational change (Spiker and Lesser, 1995; Storseth, 2004; Burke and Greenglass, 1995; Lee and Ashforth, 1993; Elrod and Tippett, 2002) and, of particular relevance to the current study, successful and sustainable Lean change (Womack, Jones and Roos, 1990; Sawhney & Chason, 2005; Shadur et al., 1995; Forrester, 1995; Fiume, 2004; Emiliani, 1998; MacDuffie, 1995). The observation by Barton & Delbridge (2000) that organizations need to understand what drives individuals to participate in modern manufacturing practices also seems to have been largely ignored.

This lack of research is inconsistent with some well-established models which consider employee functioning as a key contributor to organizational performance.

Labor economists Boyor and Smith (2002) argue that human capital investments (employee skills, values, attitudes and experiences) carry significant economic value for organizations. The person-environment fit model, which has successfully explained work-related outcomes such as job performance and job satisfaction (Tinsley, 2000), states that positive outcomes occur when an employees' (person) aspirations, values and skills are aligned with their job (the environment). Based on these models, organizations should consider employees when initiating lean change and be aware of the factors underlying an employees' receptiveness to lean.

Considering the characteristics of LP, the importance of employee motivation for implementation success is intuitive. To ensure the smooth running of the production line, employees need to be sufficiently motivated to engage proactively with their working environment and continuously to seek ways in which flow could be improved, errors minimized and waste reduced. Motivated and adaptable workers are, according to MacDuffie (1995), an essential ingredient for Lean production environments and were identified as one of the key drivers behind the successful implementation of Lean at Wiremold (Fiume, 2004).

There are concerns surrounding the motivation of employees to accept Lean change. In tune with research suggesting that employees usually react negatively to change (Elrod and Tippett, 2002; Maurer, 1997; Spiker and Lesser, 1995), as many as 75% of organizations introducing Lean experience employee resistance and this resistance spans from senior management to shopfloor (Sohal & Egglestone, 1994). Benders (1996), Grønning (1995) and Rehder (1994) all refer to employee resistance as one of the main barriers to Lean implementation. Resistance could stem from employee perceptions of, and beliefs about, Lean. There are countless examples of Lean being

linked to job losses, work intensification, higher levels of employee stress and longer working days (Benders and van Bijsterveld, 1995; Millman, 1996; Conti, Angelis, Gill, Cooper & Faragher, 2006; Jackson & Mullarkey, 2000 Berggren, 1993; Garrahan and Stewart, 1992; Parker and Slaughter, 1988; Turnbull 1988; Harrison & Storey, 1996). Arguably, employees aware of these negative aspects of Lean, perhaps through past experiences, the experiences of their colleagues or the media, are unlikely to be committed to a manufacturing approach which could, they believe, threaten their job security and/or working conditions. It is worth noting that a large number of organizations in the mid-1990s were even reluctant to be described as Lean for fears of generating negative employee perceptions and behaviors (Kinnie, Hutchinson, Purcell, 1998). The word 'Lean' itself means little or no fat and an interpretation of this within an organizational context may be job losses and increased work pressures for remaining staff.

A senior manager at one of Toyota's suppliers reported difficulties with the people side of lean claiming that, due to the failure of previous change initiatives and training programs, employees were tired of change and hence resisted the introduction of lean (Langfield-Smith & Greenwood, 1998). This is an important observation. Many organizations implement lean after a series of change programs failures. Employees may view lean as 'just another management fad' and resist the approach in the belief that it will, like its predecessors, ultimately fail.

The prerequisite for employee motivation coupled with the potential for employees to react negatively to Lean stresses the importance for research into the employee motivational aspects of lean. The paper will explore using interview, focus group and survey data, employee expectations of lean and the impact of various individual-level

factors on the reported willingness of employees in a manufacturing firm to adopt lean behaviors. Although the author recognizes the importance of external, organizational factors (leadership, management, company strategy, market conditions) to keep the paper focused, only individual-level antecedents are considered. This research will inform practitioners where, if at all, interventions should be made to enhance employee motivation for lean in the initial stages of a transformation.

1.4. Potential Drivers of Employee Motivation for Lean Change

This section explores a number of individual-level factors which, based on theoretical and empirical evidence from the organizational behavior and psychology literatures, are likely antecedents of employee motivation for Lean.

1.4.1. Theory of Planned Behavior

A useful starting point for understanding employee motivation is to delve into the psychology literature to look at how psychologists have attempted to understand, explain and manage human behavior. Ajzen's (1985, 1988) well-established Theory of Planned Behavior (TPB) is an expectancy-value model which explicitly captures the motivational factors driving behavior, and has been used extensively to understand the behavioral choices individuals make. According to the TPB, the immediate determinant of behavior is intention, which reflects a general willingness and motivation to perform the behavior. This 'behavioral intention' is influenced by three cognitive constructs – **Attitudes** (how much someone believes that engaging in the behavior will lead to positive or negative outcomes weighted by their evaluation of those outcomes); **Perceived Social Norms** (PSN - beliefs about how people

significant to the individual would view their execution of the behavior weighted by their motivation to comply with these significant others); and **Perceived Behavioral Control** (PBC - beliefs about how easy it would be to perform the behavior as determined by the opportunities and resources available). According to the TPB, individuals are more likely to have a strong intention/motivation to perform a behavior if they believe that doing so will have positive consequences which they value; that people important to them think they should perform the behavior and they are motivated to comply with the wishes of these individuals; and that they can easily perform the behavior.

The TPB has been able to explain a wide-range of employee behaviors including support for employee involvement programs (Dawkins & Frass, 2005), resistance to change (Peach, Jimmieson & White, 2005), adoption of information systems (Taylor and Todd, 1995; Harrison, Mykytyn & Riemenschneider, 1997; Liao, Shao, Wang & Chen, 1999), knowledge-sharing behavior (Ryu, Ho & Han, 2003), and job searching (Wanberg, Glomb, Song & Sorenson, 2005).

Studies have investigated the role of supervisory support on employee adoption of Lean-type behaviors. Scott and Bruce (1994) reported a positive relationship between supervisory role expectations and subordinate innovative behavior; and Steel and Lloyd (1988) demonstrated the importance of supervisory support in employee receptiveness to TQM practice and quality circles. Although these studies suggest that perceived social norms and employee willingness for lean are likely to be positively related, this has not been explicitly studied. Furthermore, no research has looked at the impact of attitudes and perceived behavioral control on employee receptiveness to

lean. The current study will be the first to assess holistically the impact of the three TPB predictors on employee willingness to adopt lean behaviors.

The decision to use the TPB framework to understand employee motivation for lean and not more popular models of motivation (e.g., Maslow's Hierarchy of Needs, Maslow 1943; Expectancy Theory, Vroom, 1964; Equity Theory, Adams, 1963) is because the TPB incorporates the construct of behavioral intention. Behavioral intention and actual behavior are highly correlated (Smetana and Adler, 1980; Manstead, Proffitt & Smart, 1983; Ajzen and Fishbein, 1980; Armitage & Connor, 2001), which means that behavior can, in effect, be accurately predicted before it occurs, thus offering organizations a timeframe for intervention. Given that intention reflects a general willingness and motivation to perform a behavior, it also serves as an appropriate dependent variable for the study.

Drawing from the theory surrounding the TPB and the evidence presented, the following is proposed:

A stronger intention to adopt lean behaviors is expected among employees who report...

Hypothesis 1: ... a more positive attitude towards their adopting of Lean behaviors.

Hypothesis 2: ...a greater perception of social norms to adopt Lean behaviors.

Hypothesis 3: ...a greater perception of behavioral control to adopt Lean behaviors.

1.4.2. Additional individual-level antecedents

The TPB is considered a complete theory of the proximal determinants of behavior (Conner & Armitage, 1998). The influence of other variables on behavior is argued to be indirect, in that the TPB variables mediate their effects. The second research gap the paper will address is to explore the extent to which the TPB variables mediate the effects of various job-related, personality, and demographic factors on employee motivation for lean. These additional variables have been carefully selected based on theoretical arguments and previous research suggesting that they impact on employee behaviors and employee reactions to organizational change and improvement initiatives. The specific hypotheses and their rationales are discussed below.

Job Satisfaction is an important variable to consider because it has strong links with a number of employee outcomes including work performance, goal attainment, employee turnover and reactions to organizational change (Shaw, 1999; Cordery et al., 1993; Iverson, 1996). Much of the research looking at job satisfaction and Lean has focused on the impact of Lean practices on employee job satisfaction (Jackson et al., 2000; Jackson and Martin, 1996, Seppala & Klemola, 2004; de Treville & Antonakis, 2006). Only one study has explored whether a person's job satisfaction is linked to their approval of a Lean production system. A survey of 200 employees in an automotive factory applying Lean revealed a significant positive relationship between job satisfaction and employee approval of Lean (Shadur et al, 1995). Although this study offers a glimpse into the relationship between work attitudes and receptiveness to Lean, it is only one study conducted in one manufacturing plant. The study also failed to measure other important variables such as those included in the TPB framework.

Based on Shadur et al's (1995) findings, it is expected that job satisfaction and intention to adopt lean behaviors will be positively related. However, it is also hypothesized that attitude towards lean will mediate the effect of job satisfaction on intention. That is, people who are satisfied with their job will have positive attitudes towards their adoption of lean behaviors and strong intentions to engage in lean methods of working. There are theoretical arguments to support this proposition. Social Exchange Theory asserts that a norm of social reciprocity operates when people feel obligated to return the goods, services and concessions offered by other individuals and groups (Gouldner, 1960). Individuals come to jobs with particular needs. When an organization provides a vehicle for satisfying those needs, increases in job satisfaction and an internal obligation to comply with organizational goals and objectives are likely to result. Employees experiencing high job satisfaction may feel an obligation to comply with change programs initiated within the organization, especially if they perceive those changes to enhance organizational performance. This could translate into a positive attitude towards their adoption of lean behaviors and subsequently a willingness to assume a lean approach to their work.

Hypothesis 4: Attitude will mediate the positive relationship between job satisfaction and intention to adopt Lean behaviors

Organizational commitment or “the relative strength of an individual’s identification with and involvement in a particular organization” (Porter, Steers, Mowday and Boulian, 1974, p604) is essential for organizations implementing lean because they need employees who will voluntarily participate in continuous improvement activities (suggestion schemes, quality circles) which fall beyond prescribed technical

requirements (Brown and Reich, 1989; Adler, 1993; Wickens, 1987; Shadur et al., 1995). In Shadur et al's (1995) study, organizational commitment was the strongest predictor of employee approval of Lean, leading the authors to conclude that it "*is of primary importance and should be included in a model that seeks to explain the adoption of Japanese manufacturing practices such as those embodied in Lean production*" (Shadur et al., 1995, p1418). Organizational commitment is also reported to be a key determinant of employee acceptance of TQM (Waldman, 1994; Coyle-Shapiro & Morrow, 2003).

It is expected that organizational commitment and intention to adopt lean behaviors will be positively related. However, it is also expected that attitude will mediate this positive relationship. This proposition is primarily driven by the organizational change literature which suggests that employees highly committed to their organization generally have positive attitudes towards change and are willing to accept different ways of working (Coopey and Hartley, 1991; Cordery et al., 1993; Guest, 1987; Iverson, 1996).

Hypothesis 5: Attitude will mediate the positive relationship between Organizational commitment and intention to adopt Lean behaviors

Role-Breadth Self-Efficacy (RBSE), the extent to which employees "*feel confident that they can carry out a broader and more proactive role, beyond traditional prescribed technical requirements*" (Parker, 1998, p. 835), is a less researched but nevertheless important motivational concept to consider in this study. It stems from Bandura's self-efficacy theory which refers to the subjective probability and belief that one is capable of successfully performing the behaviors for a specific task

(Bandura, 1977, 1982). Self-efficacy “*influences individual choices, goals, emotions reactions, effort, coping and persistence*” (Gist & Mitchell, 1992, p.186) and has strong links with job performance (Gist, 1987; Gist & Mitchell, 1992). The activities that come under the umbrella of ‘role breadth’ (analyzing problems, target-setting and suggesting improvements to working procedures) are the type of behaviors expected of employees in Lean production plants.

Self-efficacy is similar to Ajzen’s (1991) PBC because both constructs are concerned with control. The difference is that self-efficacy relates more to factors originating from within the individual (ability, motivation) and PBC, factors external to the individual (access to necessary resources, cooperation of others, opportunity) (Terry 1993; Terry and O’Leary, 1995; White, Terry & Hogg, 1994; Manstead & Van Eekelen, 1998).

Given its relative novelty, the RBSE construct is rather under-researched and no studies have investigated the links between RBSE and employee motivation for Lean. One study does, however, suggest that employees with high RBSE are more likely to proactively engage their work environment (Axtell and Parker, 2003). There is also evidence indicating that employees who feel capable performing particular activities are motivated to engage in them (Lent, Brown & Larkin, 1987); and that an individual’s readiness for change and their reported self-efficacy to change jobs are significantly related (Cunnigham, Woodward, Shanon, Macintosh, Lendrum, Rosenbloom & Brown, 2002).

PBC is expected to mediate the positive relationship between RBSE and intention because the two constructs are so closely linked. Attitude is also expected to act as a

mediator because individuals who feel confident in their ability to engage in a particular behavior or set of behaviors tend to have positive attitudes towards adoption of that/those behavior(s) (Bandura, 1982).

Hypothesis 6: Perceived Behavioral Control will mediate the positive relationship between RBSE and intention to adopt Lean behaviors

Hypothesis 7: Attitude will mediate the positive relationship between RBSE and intention to adopt Lean behaviors

Personality can accurately predict and explain various employee behaviors (Barrick et al., 2001; Barrick et al., 1991; Salgado, 2003; Tett, Jackson & Rothstein, 1991). The Five Factor Model of personality, which has dominated personality research in recent decades, represents a robust taxonomy of personality. It states that personality can be divided into five distinct, broad dimensions - Neuroticism (the tendency to experience emotions such as anxiety, insecurity, tension, and worry), Openness to experience (how imaginative, inventive, and original someone is), Extraversion (the extent a person is assertive, outgoing, talkative, adventurous and energetic), Agreeableness (how good-natured, appreciative, trusting, flexible, tolerant, helpful, and cooperative someone is) and Conscientiousness (how responsible, thorough, efficient, reliable, persevering, hardworking, task-focused and dependable someone is). An individual's scoring against each of these traits remains relatively stable across the life course (Costa, McCrae & Siegler, 1999). The FFM generalizes reliably across different types of samples, methodological variations, languages and cultures (John & Srivastava, 1999; McCrae and Costa, 1997; Digman, 1990; Hogan, 1991), thus supporting the universal application of the model.

Despite the Big Five's evident power and its links to employee behavior, there is no research which has looked at its impact on employee motivation for Lean. The study bridges this empirical gap. Incorporating personality into the study introduces an important dimension. Attitudes, perceptions, and self-efficacy are all transient and can change with new information and experiences. The relative stableness of an individual's personality means that if the Big Five prove to be significant determinants, then the opportunities for organizations to manage the motivation of existing staff is called into question. Only through recruitment of people who match the lean personality profile could companies ensure a workforce motivated for lean.

Given the lack of research in this area, the author considers the reported relationships between the Big Five and worker engagement in/willingness to adopt key lean behaviors. This research is relevant to the current study because individuals are generally more receptive to situations that support expression of their personality (see Ickes, Snyder and Garcia, 1997).

Table 1 contains, in rows, the key Lean behaviors and a 'willingness for organizational change' item. In columns are the five personality traits and a list of studies which have reported links between the traits and engagement in/willingness to adopt the behavior. The Table details whether the studies reported a significant positive or negative relationship between the trait and the behavior/willingness for change item.

Table 1: The Big Five personality traits and engagement in key lean behaviors

	Personality Trait					Studies
	O	C	E	A	N	
Team Working	+	+	+	+	-	Lepine and van dyne (2001)
		+	+	+	-	Barrick, Stewart , Neubert and Mount (1998)
		+	+	+	-	Thoms, Moore & Scott (1996)
		+	+			De Jong, Bouhuys & Barnhoorn (1999)
		+		+	-	Dunn, Mount, Barrick & Ones (1995)
				+	-	Mount, Barrick & Stewart (1998)
		+	+	+		Morgeson, Reider & Campion (2005)
Problem-Solving	+	+	+	+	-	Bastian, Burns and Nettelbeck (2005)
					-	Heppner & Lee (2002).
Employee Autonomy/ Empowerment	+					Furnham, Petrides, Tsaousis, Pappas & Garrod (2005)
	+					Williams (2004)
	+			+		Stevens & Ash (2001)
Participative Decision-Making	+			+		Stevens & Ash (2001)
Multi- Skilling/motivation for skill acquisition		+			-	Colquitt, LePine & Noe., 2000
		+			-	Martocchio and Judge, 1997
		+			-	Colquitt and Simmering, 1998
		+			-	Webster and Martocchio, 1993
Job Rotation/labor flexibility					-	Karuppan (2004)
Volunteering For Extra-Job Activities		+	+	+	-	Organ and Ryan (1995)
Willingness For/attitude towards Organizational Change	+	+	+	+	-	Vakola, Tsaousis and Nikolaou, 2004
	+	+				Griffin & Hesketh (2005)

Note: O=openness to new experiences, C=conscientiousness, E=extraversion, A=agreeableness, N=neuroticism.

Although the studies reviewed in Table 1 vary in their research objectives, measures, analyses and participants, a clear pattern emerges. People scoring high on openness, conscientiousness, extraversion and agreeableness and low on neuroticism tend to demonstrate greater engagement in/motivation for Lean. Employees with this personality profile are expected to report strong intentions to adopt lean behaviors. However, based on studies demonstrating that employees with this personality profile have positive attitudes towards organizational change (Vakola, Tsaousis and Nikolaou, 2004; Griffin & Hesketh, 2005), attitude is expected to act as a mediator.

Hypothesis 8: Attitude will mediate the positive relationship between openness and intention to adopt Lean behaviors

Hypothesis 9: Attitude will mediate the positive relationship between conscientiousness and intention to adopt Lean behaviors

Hypothesis 10: Attitude will mediate the positive relationship between extraversion and intention to adopt Lean behaviors

Hypothesis 11: Attitude will mediate the positive relationship between agreeableness and intention to adopt Lean behaviors

Hypothesis 12: Attitude will mediate the negative relationship between neuroticism and intention to adopt Lean behaviors

2. Method

2.1. Participants and Procedure

The study was conducted with a holding company with subsidiaries engaged in the research, development, manufacture, and marketing of branded and brand equivalent pharmaceuticals. Zeron, a pseudonym, employs around 5,800 people in more than 30 countries throughout the world. The participating site, based in Southern Ireland, was established in 1990 and currently employs around 750 people. In early 2006, Zeron was acquired by a major pharmaceutical company. This parenting company required the site to reduce costs and waste and to ramp up production by the end of 2006. To achieve these objectives, the Zeron Ireland senior management team chose to introduce Lean manufacturing. They were keen to establish pre lean implementation the likelihood of employee resistance to lean and where to concentrate resources in order to foster employee motivation for lean.

Both qualitative and quantitative data collection methods are employed. Ajzen (1991), the founder of the TPB, argues that, to identify the beliefs or outcome expectations underlying attitudes towards performing a behavior, a sample of respondents representative of the population of interest should be asked what they consider to be the potential outcomes if they performed the behavior. A cross-section of Zeron employees from shopfloor to senior management (n=38) participated in either a structured interview or focus group in which they were asked what they thought would be the positive and negative outcomes of their adoption of Lean behaviors. Detailed notes were taken during the discussions by an independent scribe. Tape-recording was not used as senior management felt that this would either deter

participation or compromise the integrity of responses. Careful and systematic analysis of the notes yielded nineteen outcomes beliefs.

A questionnaire formed the main data collection method. All 750 employees at the Zeron Ireland site were invited by senior management to complete the questionnaire. 331 employees did so, reflecting a 44% response rate. Of the respondents, 16.1% (n=48) are managers, 51% (n=148) males and 61.9% (n=192) union members. The average organizational tenure is 6.73 years (SD=4.4). 10.7% (n=33) respondents are aged between 16 and 25, 55.7% (n=171) between 26 and 35, 26.1% (n=80) between 36 and 45, 6.8% (n=21) between 46 and 55 and 0.7% (n=2) between 56 and 65. Comparison of these statistics with company records showed that the respondent sample was representative of the workforce at the site.

2.2. Measures

Items assessing the TPB constructs were carefully designed following recommendations from Ajzen and Fishbein (1980), and the content of previous instruments which have successfully tested these constructs (e.g., Ajzen & Driver, 1992; Beck & Ajzen, 1991).

Attitude. Respondents rated on a scale anchored by -3 (extremely unlikely) and 3 (extremely likely) how much they felt that their adoption of Lean ways of working at their company would lead to each of the nineteen outcome beliefs identified in the interviews and focus groups. Respondents evaluated how positive they felt each of the outcomes was on a scale ranging from -3 (extremely bad) to 3 (extremely good). Each of the belief scores were multiplied by its corresponding evaluation score.

Attitude towards adopting Lean behaviors represented the sum of these calculated scores.

Perceived Social Norms (PSN). Respondents indicated the extent to which others would support their adoption of Lean behaviors, and how much they took account of the opinions of each of these individuals/groups. The others specified were “people important to you”, “colleagues”, and “your supervisor/manager”. The perception of support from the referent individual/group was multiplied by its corresponding ‘motivation to comply’ score. The overall PSN score reflected the mean across these three calculated scores.

Perceived Behavioral Control (PBC). Participants rated various items tapping their perceived confidence and ability to adopt Lean behaviors such as “I feel confident that I can adopt Lean ways of working”. Responses were combined to form an overall PBC score.

Behavioral Intention (BI). Responses to “I intend to adopt Lean ways of working” and “I expect to adopt Lean ways of working” were averaged to form an index of intention.

The PSN, PBC and intention items all employed a response scale anchored by *extremely unlikely* (-3) and *extremely likely* (+3).

Job satisfaction. This was measured using the Warr, Cook and Wall (1979) scale. Respondents rated from *extremely dissatisfied* (0) to *extremely satisfied* (6) their level of satisfaction with various job characteristics. Responses to the items were averaged

to form an overall satisfaction score. This scale has demonstrated good internal reliability, and construct and criterion validity (Griffin, Patterson & West, 2001; Tesluk, Vance & Mathieu, 1999; Warr et al., 1979). It has been used with both managers and non managers, with employees of various occupations and in the manufacturing sector (see Workman & Bommer, 2004; Lok & Crawford, 2004; Patterson, Warr & West, 2004; Parker, 2000).

Organizational commitment. Mowday, Steers and Porter's (1979) Organizational Commitment Scale was selected because it contains items which specifically tap into the core components of organizational commitment, namely the employee's belief in, and acceptance of organizational values and goals; the willingness of employees to exert considerable effort to achieve organizational goals; and their desire to maintain membership in the organization. Using a scale ranging from 'strongly disagree (0) to 'strongly agree' (4), respondents rate their agreement with fifteen items. Several of the items are reverse scored before all the responses are combined to form an overall organizational commitment score with a higher the score signaling greater organizational commitment. This measure has demonstrated high internal reliability and convergent, discriminant and predictive validity (Ferris & Aranya, 1983; Cook, Hepworth, Wall and Warr, 1981). It has been used with manufacturing personnel and with both managers and non-managers (Huselid & Day, 1991; Gupta, Prinzinger & Messerschmidt, 1998; Martin, Jones & Callan, 2006).

RBSE. A scale developed by Parker (1998) formed the basis of the RBSE measure. Respondents rated their confidence to engage in a number of proactive, interpersonal and integrative activities (such as problem-solving, suggestion-making and participative decision-making) on a scale ranging from not at all confident (0) to very

confident (4). Cronbach's alpha for this scale is reported to be as high as 0.96 (Parker, 1998). The scale has been used with employees of various occupational levels and in different manufacturing firms (Rafferty & Griffin, 2006; Parker, 2000; Axtell & Parker, 2003). It was felt that, after careful analysis of some illustrative Lean literatures (Womack et al., 1990; Jackson, Wall, Martin & Davids, 1993), some additional behaviors should be added to the scale for it to fully capture the wide-range of behaviors expected of employees in Lean organizations. Items added included 'rotating jobs and tasks with colleagues', 'working as part of a team', 'training colleagues' and 'keeping one's work area neat and tidy'. Responses to the items were averaged to form an overall RBSE score.

To ensure respondents shared a common understanding of what was meant by 'adopting Lean behaviors', the RBSE scale was positioned at the beginning of the questionnaire and was used to describe the type of behaviors employees in Lean organizations would be expected to adopt.

Personality. Due to its brevity (only 44 items), the Big Five Inventory (BFI) developed by John, Donahue, and Kentle (1991) was chosen. The BFI correlates highly with the more popular personality measures such as the NEO Personality Inventory (Costa and McCrae, 1992) and Goldberg's scale (1992). The BFI also retains strong psychometric properties. The alpha reliabilities typically range from 0.75 to 0.90, and the 3 month test-retest reliabilities range from 0.80 to 0.90 (see John & Srivastava, 1999). Using a scale anchored by strongly disagree (0) and strongly agree (4), respondents indicate their agreement with various statements such as 'I see myself as someone who prefers work that is routine', one of the 'openness to experience' items. Responses to items are combined to form scores for each of the five traits.

The BFI was preferred to Costa and McCrae's (1992) Five Factor Inventory (NEO-FFI), because the NEO-FFI uses a complex sentence format which some of the less well-educated workers could find difficult to understand. Goldberg's (1992) Trait Descriptive Adjectives was not chosen because it does not provide as much context as the short-phrase items used in the BFI (John & Srivastava, 1999). Single adjectives items are also answered less consistency than when adjectives are accompanied by definitions or elaborations as is the case with the BFI (Goldberg & Kilkowski, 1985).

Biographical Information. Each respondent indicated their age-group in years (16-25, 26-35, 36-45, 46-55, 56-65), organizational tenure in years, gender, organizational level (manager vs. non manager), and whether they are a member of a union.

3. Results

The outcome expectations identified in the interviews and focus groups and the percentage of respondents who reported each expectation in the questionnaire are detailed in Table 2. Although some respondents reported negative expectations of lean namely that it would contribute to an increase in job stress, job losses and even company closure, there was an overwhelming tendency for people to report positive expectations of lean both for themselves (help them to work smarter and to save time) and for the organization (improve company efficiency and competitiveness).

Table 2: Employee outcome expectations of their adopting of lean behaviors.

Outcome expectation	% reporting expectation
Help me to work smarter	78.3
Improve efficiency at this company	74.1
Make this company more competitive	73.3
Improve processes at this company	72
Increase productivity at this company	70.9
Help to reduce costs within this company	70.4
Help me to save time	68.9
Increase profits at this company	68.4
Reduce the amount of work in progress	64.1
Make me feel more satisfied with my job	63.3
Improve the quality of products manufactured at this company	62.8
Make me feel motivated about my work	60.7
Improve communication at this company	60.5
Make my job less frustrating	58.8
Make my job more interesting	58.1
Boost morale at this company	57.6
Contribute to job losses at this company	29.5
Make my job more stressful	29.3
Contribute to this company closing	8.4

Table 3 shows the zero-order correlations between the variables and the Cronbach alpha scores for each of the measures on the diagonal. Each of the alpha scores is higher than 0.70, suggesting reliable measures (Nunnally, 1978).

Table 3: Means, standard deviations, zero-order correlations and alpha coefficients for TPB constructs, job-related variables , personality traits and demographic variables (n = 331)

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1 Intention	1.15	1.32	0.92																
2 Attitude	2.52	2.6	0.44**	0.94															
3 PSN	1.43	2.55	0.34**	0.35**	0.76														
4 PBC	0.85	1.15	0.66**	0.33**	0.15**	0.84													
5 Job satisfaction	3.33	0.63	0.27**	0.24**	0.11*	0.31**	0.91												
6 Organizational commitment	2.12	0.56	0.38**	0.36**	0.25**	0.33**	0.64**	0.88											
7 Role breadth self-efficacy	2.72	0.71	0.22**	0.46**	0.19**	0.23**	0.1	0.13*	0.95										
8 Conscientiousness	3.05	0.48	0.17**	0.18**	0.12*	0.11	0.08	0.21**	0.26**	0.8									
9 Agreeableness	2.99	0.48	0.19**	0.16**	0.12*	0.16**	0.20**	0.33**	0.20**	0.58**	0.79								
10 Openness to experience	2.54	0.49	0.18**	0.27**	0.1	0.15*	-0.01	0.08	0.49**	0.29**	0.24**	0.75							
11 Extraversion	2.42	0.51	0.11	0.23**	0.11	0.12*	0.09	0.07	0.28**	0.36**	0.30**	0.34**	0.74						
12 Neuroticism	1.42	0.62	-0.07	-0.14*	-0.08	-0.19**	-0.1	-0.16**	-0.21**	-0.47**	-0.47**	-0.21**	-0.45**	0.81					
13 Organizational level	0.16	0.37	0.13*	0.23**	0.07	0.03	0.14*	-0.04	0.27**	0.06	-0.07	0.01	-0.02	0.02	/				
14 Organizational tenure	6.73	4.4	-0.04	-0.08	-0.07	-0.11	0.04	-0.05	-0.02	-0.09	-0.02	-0.04	-0.14*	0.11	0.07	/			
15 Union membership	/	/	-0.1	-0.13*	-0.05	-0.02	-0.16**	0.01	-0.31**	-0.01	0.04	-0.15**	-0.08	0.03	-0.71**	-0.14*	/		
16 Gender	/	/	0.04	-0.01	0.02	0.01	0.01	-0.02	-0.08	0.06	0.08	-0.21**	-0.05	0.13*	0.09	-0.02	0.03	/	
17 Age	/	/	-0.01	0.01	-0.01	-0.06	0.02	0.1	0.09	0.04	0.03	0.04	-0.06	-0.08	0.15*	0.44**	-0.28**	-0.17**	/

SD = standard deviation, ** = correlation is significant at the 0.01 level, * = correlation is significant at the 0.05 level

Organization level (managers=1, non-managers=0), union membership (union members=1, non-union member=0), gender (females=1,males=0), and age (16-25 years=1, 26-35 years=2, 36-45 years=3, 46-55 years=4, 56-65 years=5) are all represented by dummy variables.

Intention is significantly and positively correlated with attitude ($r = 0.44, p < 0.01$), PSN ($r = 0.34, p < 0.01$) and PBC ($r = 0.66, p < 0.01$), providing support for hypotheses 1, 2 and 3 respectively.

A stepwise multiple regression was conducted. All the TPB (attitude, PSN, PBC), job-related (job satisfaction, organizational commitment, RBSE), personality (openness, conscientiousness, extraversion, agreeableness, neuroticism) and demographic variables (organizational level, organizational tenure, union membership, gender, age) were entered as independent variables and intention, as the dependent variable. PBC was entered first and explained 39.6% of the variance in intention ($F(1, 234)=153.66, p<0.001$). Attitude was entered second and explained a further 7.6% ($F(1, 233) = 33.46, p<0.001$). PSN was entered third, explaining a further 2.8% ($F(1, 232)=13.09, p<0.001$). None of the non-TPB variables explained a significant percentage of the variance in intention. These results suggest that the TPB variables act as complete proximal antecedents of intention with PBC as the principle antecedent. Table 4 summarizes the regression equation.

Table 4: Stepwise multiple regression of significant predictors of intention

Variable	Multiple R	B	Standard error b	Beta	t	Significance of t
PBC	0.63	0.60	0.06	0.52	10.50	0.001
Attitude	0.69	0.11	0.03	0.23	4.36	0.001
PSN	0.71	0.09	0.03	0.18	3.62	0.001

Three stepwise multiple regressions were conducted with each of the three proximal antecedents of intention - PBC, attitude and PSN – acting as dependent variables and the job related, personality and demographic variables as independent variables.

Attitude as dependent variable: RBSE is entered first, explaining 19% of the variance ($F(1, 234)=54.90, p<0.001$). Entering organizational commitment second explains a further 11.1% ($F(1, 233)=37.03, p<0.001$). Entering organizational role third explains a further 1.9% ($F(1, 232)=6.49, p<0.05$).

PSN as dependent variable: Organizational commitment is entered first, explaining 7.1% of the variance ($F(1, 234)=18.02, p<0.001$). Entering RBSE second explains a further 3.1% ($F(1, 233)=8.00, p<0.01$).

PBC as dependent variable: Job satisfaction is entered first and explains 10.8% of the variance ($F(1, 234)=28.42, p<0.001$), RBSE is entered second explaining a further 5% ($F(1, 233)=13.86, p<0.001$) and organizational commitment is entered third explaining a further 1.4% ($F(1, 232)=4.04, p<0.05$).

The regression model is shown in Figure 1. The beta weights for each of the relationships are above their corresponding lines.

Although the correlation matrix (Table 3) shows a significant positive relationship between intention and job satisfaction ($r=0.27, p<0.01$), job satisfaction and attitude ($r=0.24, p<0.01$) and attitude and intention ($r=0.44, p<0.01$), the regression analysis

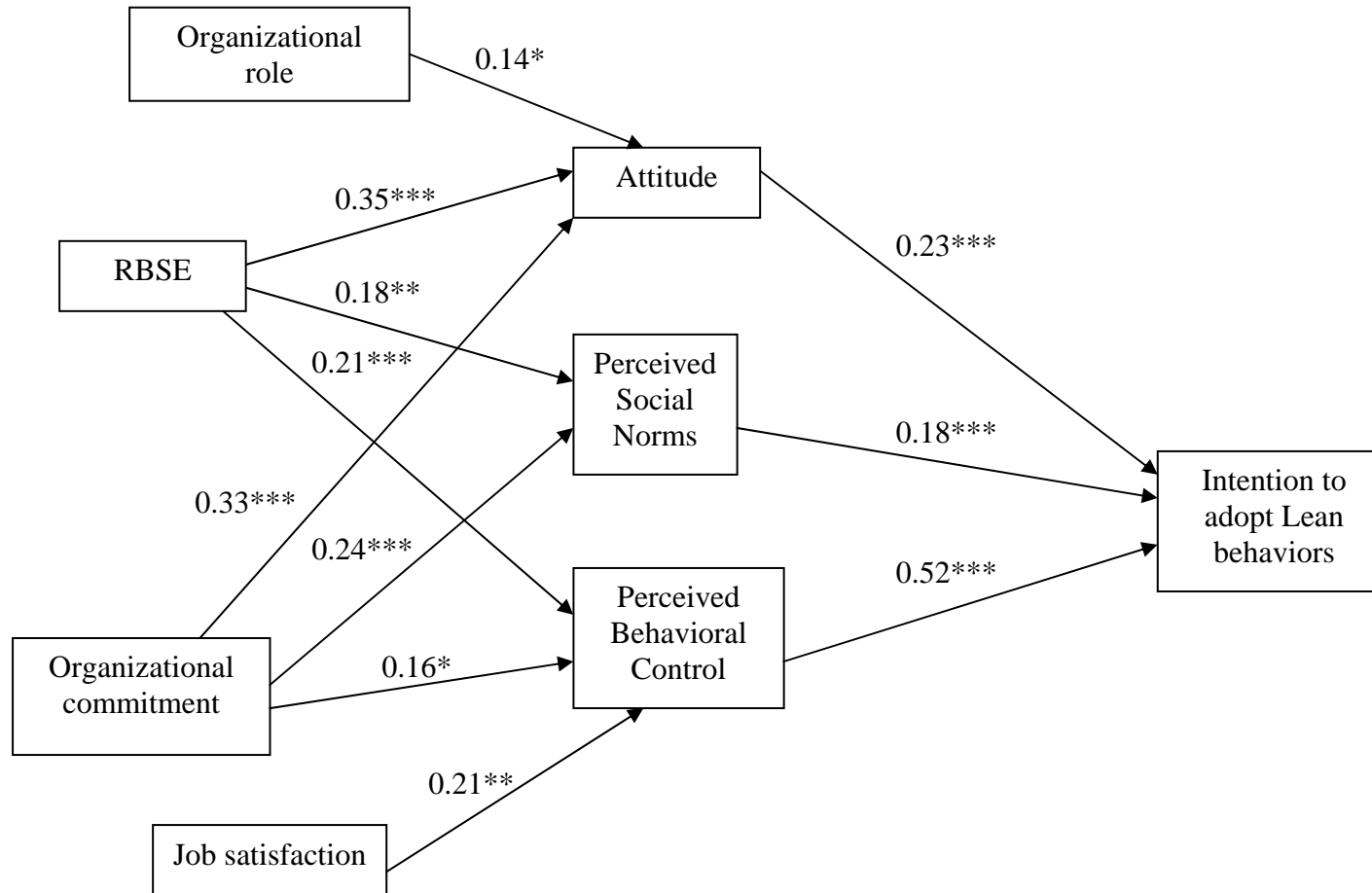


Figure 1: Regression Model of employee intention to adopt Lean behaviors (n=331)

suggests that attitude does not mediate the job satisfaction-intention relationship, rejecting hypothesis 4. Instead this relationship is mediated by PBC.

The regression analysis not only shows that attitude mediates the positive relationship between organizational commitment and intention, supporting hypothesis 5, but also that PSN and PBC act as mediators in this relationship.

As predicted, the positive relationship between RBSE and intention is mediated by PBC (Hypothesis 6) and attitude (Hypothesis 7). PSN also mediates this relationship.

Despite conscientiousness, agreeableness and openness each having significant positive relationships with intention, none of the personality traits play a significant role in any of the regression analyses. This suggests that the effects of personality on intention are explained by the relationship the Big Five have with the other variables considered in the study. Hypotheses 8, 9, 10, 11 and 12 are therefore rejected.

Given the central role of attitude, a stepwise regression was conducted to determine which outcome expectations explain the most variance in the overall attitude score. The results are summarized in Table 5. As indicated, expectations that adoption of lean behaviors will improve efficiency and help employees to work smarter appear to be the principle determinants of a positive attitude and explain 56.4% and 11% of the variance in attitude respectively.

Table 5: Stepwise multiple regression of significant outcome expectation predictors of attitude

Outcome expectation (My adopting lean ways of working will...)	% variance in attitude explained	F change	df 1	df 2	Sig level	Beta	Sig level
...improve efficiency	56.4	375.59	1	290	0.000	0.12	0.013
...help me to work smarter	11.0	97.32	1	289	0.000	0.11	0.013
...boost morale	3.7	37.27	1	288	0.000	0.16	0.000
...improve the quality of products manufactured	3.2	39.55	1	286	0.000	0.12	0.001
...contribute to the company closing	2.7	29.74	1	287	0.000	-0.13	0.000
...improve communication	1.3	16.79	1	285	0.000	0.09	0.014
...make my job more stressful	1.2	16.34	1	284	0.000	-0.10	0.000
...make this company more competitive	0.8	11.76	1	283	0.001	0.17	0.000
...make me feel more satisfied with my job	0.6	9.07	1	282	0.003	0.09	0.022
...increase company productivity	0.5	7.42	1	281	0.007	0.12	0.004
...make my job less frustrating	0.3	5.18	1	280	0.024	0.09	0.032
...contribute to job losses	0.3	4.04	1	279	0.046	-0.06	0.046

4. Conclusions, Practical Implications and Future Research Avenues

The findings support the utility of the TPB as a model for understanding the proximal antecedents of employee intention to adopt lean behaviors. Organizational role, role-breadth self-efficacy, organizational commitment and job satisfaction act as indirect, distal predictors, with their impacts being mediated by attitudes, PSN and PBC. The implications of the findings for organizations embarking on lean change and future research avenues are discussed.

4.1. Communication – managing attitudes and perceptions

The finding that attitudes directly influence employee intentions to adopt Lean behaviors carries an important message to the practitioner. Attitudes are amenable to persuasion and can change as new information is acquired. Communication is an effective mechanism for changing attitudes and their underlying beliefs. There is a large body of attitudinal research showing that, by presenting individuals with strong, high-quality, self-relevant arguments, it is possible to develop new, readily accessible attitudes that are persistent, resistant to counter persuasion and strong predictors of behavior (Chaiken, 1980; Petty and Cacioppo, 1986; Cacioppo, Petty, Kao and Rodriguez, 1986). The current study identifies the principle beliefs underlying attitudes. Based on the findings, a communication strategy should certainly highlight and demonstrate how employee adoption of Lean behaviors will improve company efficiency and help employees to work smarter.

PBC is the principle antecedent to intention and constitutes the beliefs individuals hold about how easy it would be for them to perform a behavior as determined by the opportunities and resources available to them (Ajzen, 1985, 1988). A communication campaign should reassure employees that the organization will provide sufficient and appropriate resources to facilitate employee adoption of lean behaviors.

Managers tended to report more positive attitudes towards adopting lean behaviors than non-managers. This finding probably reflects the greater communication about lean Zeron managers received. To ensure full employee buy-in and support, staff of all organizational levels should receive appropriate communication about lean and the advantages of assuming a lean approach to their work. The communication could take various forms - meetings, monthly newsletters and employee notice boards.

4.2. Training – managing role-breath self-efficacy beliefs.

RBSE appears to be an important construct in the study with impacts on each of the three direct predictors of intention. RBSE, similar to attitudes, can be managed and is susceptible to change. One of the most effective ways to enhance self-efficacy beliefs is through training (Frayne and Latham, 1987; Gist, 1989; Gist, Schwoerer and Rosen, 1989; McDonald, Siegall, Morris, 1993). Niepce and Molleman (1998) argue that training is an important aspect of lean change because it serves to engage employees in improvement activities. Longitudinal research has shown that training can increase people's confidence to accept a more proactive and interpersonal role within the workplace (Axtell and Parker, 2003). There are several training methods. On-the-job training, the method favored by Toyota, provides employees with the opportunity to

engage in behaviors that help build the skills, coping abilities and exposure needed for successful task performance. It is well established that allowing employees to experience directly new systems and ways of working is an effective means for teaching new skills (Hoberman & Mailick, 1992; Mohrman & Mohrman, 1993). Experiential learning can also demonstrate to employees how Lean change might be achieved, and the advantages of lean. Observing individuals who have already mastered the behaviors is another effective training method (Bandura, 1977, 1982).

In the current study, commitment was significantly related to the three direct predictors of intention. Training has been linked to enhanced organizational commitment (Bartlett, 2001), perhaps because it is perceived as a type of reward. Training could boost employee motivation for lean through increased commitment as well as heightened RBSE.

4.3. Future Research Avenues

Employees in this study tended to report, on average, quite favorable attitudes and intentions towards adopting lean behaviors, findings which sit in stark contrast to previous research suggesting that employees react negatively to lean (Sohal & Egglestone, 1994; Benders, 1996; Grønning, 1995; Rehder, 1994). Prior to the lean implementation, Zeron had adopted a Continuous Improvement (CI) approach to the business and the interview/focus groups revealed that many employees felt positive about the achievements under CI and saw lean as a logical, appropriate next step. Their positive approach to lean may, in part, be attributable to the successes achieved under CI. It would be useful to assess employee reactions and attitudes towards lean

in different organizations and industries to determine the generalisability of the findings and the true prevalence of employee resistance to lean.

The current study investigates the impact of individual-level variables on employee intention to adopt lean behaviors. Future research should explore how these variables influence actual employee engagement in lean behaviors. Although previous studies suggest that intention and behavior are highly correlated (Smetana and Adler, 1980; Manstead et al, 1983; Ajzen and Fishbein, 1980), data is needed to confirm whether such a correlation exists for employee engagement in lean behaviors. Adopting a longitudinal design would provide data on the direction of the relationships discussed in this paper. Although the author took measures to reduce the effects of common method variance found in self-report data (the employment of different scales and response formats, the use of reverse scoring), research which combines both self-report and objective measures (workplace observations, supervisor/colleague reports) would provide a richer dataset on which firmer conclusions could be made.

The individual-level antecedents considered in the study explain 50% of the variance in intention, leaving 50% unexplained. Organizational level factors (leadership, company strategy, technology) may account for this unexplained variance. Studies which consider organizational in addition to individual-level antecedents could shed some light on this unexplained variance.

4.4. Final Comments

The paper has addressed an important yet to date largely neglected aspect of initiating Lean change. The findings suggest that the TPB model can be applied to understand employee intention to adopt Lean behaviors and that the model mops up the influence of other individual-level variables. Employee motivation for Lean is directly linked to attitudes, and perceptions of ones' ability and the perceived social pressures to adopt Lean behaviors. Distal antecedents include role-breath self-efficacy, job satisfaction, organizational commitment and organizational level. Through carefully designed communication and training programs, organizations should be able to manage, to some extent, employee motivation for lean. The research marks an initial step to unearthing some of the individual-level factors underlying the employee motivation reported to be essential for successful implementation of Lean manufacturing practices. Further investigations in this area are clearly warranted and the author has suggested some future avenues to explore.

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